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Eliminating Sulphur from the Atmosphere

THE problem of prevention of atmospheric corrosion is not necessarily the same as that of preventing pollution dangerous to health. The smoke pall which cuts off ultraviolet rays and causes bodily ill-health can only be reduced by ensuring complete combustion of fuel; that is a problem for the fuel technologist. The damage to buildings and metal structures is now believed to be due to the chemical action of the sulphur which is emitted during the combustion of fuel in the form of sulphur dioxide and trioxide. The problem of removing this very minute amount of sulphur from the atmosphere is an interesting exercise in chemistry. There is no doubt about the necessity, as is shown by Dr. Vernon's figures requoted in the current report of the Chemistry Research Board. It appears from these that the rate of corrosion of steel in air containing traces of SO_2 is some 30 times greater than in air free from the gas.

No one took any notice of sulphur emission, it being no one's business to do so, until hard facts brought the business community up against it. In 1929 a judgment given at Manchester sustained a claim for damages for land deleteriously affected by sulphur dioxide. This focused attention on the subject, and resulted in a popular demand that power stations burning 1,000 or 2,000 tons of coal per day should not be situated in populous districts unless means were adopted for removing both dust and sulphur from the waste gases. As means become available there will be the demand for the elimination of sulphur from the gases evolved from every chimney above some economically-limited rating. This problem and its solution will ultimately affect every manufacturer in the country who uses fuel.

Dr. R. Lessing gave, in his Chairman's address to the London Section of the Society of Chemical Industry, an intensely interesting account of the development of a sulphur removal process at Fulham power station. A method used at Battersea utilises the natural alkalinity of the Thames waters, and at the time the Fulham station was under consideration it was considered that no further utilisation of the Thames could be permissible. Accordingly a self-contained process was sought evolving no effluent. The initial concentration of the SO_2 in the waste gases was 0.9 grains per cu. ft., and this had to be reduced to about 0.03 grains, the total gas now being evolved from Fulham being 750,000 cu. ft. per minute. Plain water washing reduced the sulphur by 45 per cent., but this was insufficient and the addition of lime to the water was tried. Preliminary experiments showed it would probably be possible to eliminate over 90 per cent. of the sulphur in this way. These experiments were made on a washer intended for flue dust extraction, and the size of a plant to deal with 750,000 cu. ft. of gas per minute would have been enormous. The surface of the scrubbing area which was only 4 sq. ft. per cu. ft. of space was increased to 36 sq. ft. by packing a washer with contact rings, and later a still better result was obtained by the use of the new I.C.I.-Howden washer.

It was felt, however, that there was a possibility that the washer might become blocked in use, and experiments proved that this fear was only too well founded. Calcium sulphate crusts stopped the operation after three days, whether lime or calcium carbonate was used. The cause was proved to lie not in insufficient irrigation of the surfaces, which one would naturally suspect, but in the formation of an interesting stable supersaturated solution of calcium sulphate which was not precipitated by seeding. For the washing, a 5 per cent. suspension of lime was used and Dr. Lessing made the discovery that the supersaturation could be suppressed by also suspending in the liquor 5 per cent. of the dihydrate, $CaSO_4,2H_2O$. Thus the process contravenes another acceptable principle, and uses for washing a sludge containing 10 to 15 per cent. of suspended solids.

It is manifestly impossible to recall here more than a small fraction of Dr. Lessing's very important and interesting address, but we must content ourselves with recording that as the result of his work the process as now operating reduces the "sulphur dioxide" content of the exit gases at Fulham as disclosed by official tests to 0.0046 grains per cu. ft., this including 20 per cent. of oxides of nitrogen. The cost seems a matter of some doubt. Authoritative figures of 4s. per ton of coal used were given, but Dr. Lessing maintained that the true cost was less than half of this. The cost at Battersea is 1s. 6d. per ton of coal. It is interesting to speculate how far this process will be applicable to smaller works, and what will be the cost on the smaller scale.

In the national interests it would appear desirable that systematic and organised co-operation between producers, distributors and consumers of fuel of all kinds, assisted by the scientist and the engineer, should be continually pressed forward in order to discover how our resources of coal and all its derivatives can be made the best use of. . . .

—Lt.-Col. J. H. M. Greenly.

Notes and Comments

Poland's Chemical Trade and Industry

THE year 1937 saw a continuation of Poland's industrial expansion on the intensive scale which began in 1936, according to a report (dated June, 1938) on the economic and commercial conditions in the country issued by the Stationery Office for the Department of Overseas Trade. Imports increased correspondingly and exports also rose but not to such a great extent. In the chemical trade with the U.K. imports of chemical and pharmaceutical products, dyes and colours from the United Kingdom increased from 4,666 thousand zlote in 1936 to 5,328 thousand zlote in 1937, and exports to the United Kingdom fell from 2,546 to 2,519 thousand zlote. All sections of industry shared in the general expansion of industrial production; the Polish chemical industries are said to be developing satisfactorily largely with Government support, and are gradually replacing imports of many products. Statistics of production in these industries show a remarkable expansion during 1937 in the manufacture of artificial fibres and of fertilisers, as compared with the previous year. The production of heavy chemicals remained fairly steady. New items purchased last year included special grades of lead oxide; sodium perchlorate; metallic stearates; butyl and benzyl alcohols; acetaldehyde and crotonaldehyde; and a large number of aromatic esters and dyestuff intermediates.

The Work of the Government Laboratory

THE report of the Government Chemist upon the work of the Government Laboratory for the year ending March 31 last, extracts from which are published on page 333, is an impressive record of analytical chemistry. The 562,549 samples examined during the year, an increase of 17,316 on the preceding year, comprised substances of the most diverse character. They included, for example, samples of foodstuffs, fertilisers, alcohol, wines and spirits, silk and artificial silk, oils, drugs, dyestuffs, and a hundred and one comparatively small miscellaneous collections of samples examined for different Government departments. It is not unnatural that the experience gained in carrying out this large-scale analytical work suggests new methods, and improvements in existing methods, of detecting and determining substances; indeed, this is a most valuable part of the Laboratory's work. Some of the investigations are described in the twenty-odd papers and reports published during the year by members of the staff.

A Notable Anniversary

ANNIVERSARIES of the founding of successful industrial enterprises are always interesting events. They provide an opportunity of casting the mind back to the very beginnings of the business, to observe its early difficulties, and how they were overcome, to note its achievements and steady growth as time went on and often to draw from its record an object-lesson in tenacity and high courage. The fiftieth anniversary of the founding of the pharmaceutical department of Fredrich Bayer and Co., at Elberfeld, which is commemorated this year, does this and much more. The company were the pioneers in the field of chemotherapy and it is no exaggeration to say that the opening of this department had a vital influence on the welfare of mankind. It is difficult to realise now that until the eighties the few existing remedies were natural substances; the introduction of phenacetin fifty years ago, the original preparation to bear the name of Bayer, was the first successful attempt at synthesising drugs. Since that time Bayer's have introduced many products of revolutionary character, for example, Plasmoquine, Germanin (Bayer 205), Novocain, Salvarsan, and last, but not least, Prontosil. The last-named discovery, as important as that which marked the foundation of Bayer's, was honoured by the highest award at the International Exhibition in Paris in 1937. A most attractive, well-illustrated booklet, has been issued by the company to record the historical development of their work and their organisation from the modest laboratories at Elberfeld and Hoechst, the formation of the I. G. Farbenindustrie A.-G., down to the office centralisation of the Bayer department of the I.G. at Leverkusen. The extraordinarily rapid progress which has been made in synthetic drugs and pharmaceuticals during the past fifty years received no small contribution from the house of Bayer.

Home Food Production

AGRICULTURE has always seemed to be a subject producing the most violent differences of opinion and the farmer's perpetual grouse is proverbial. Recent political events once again focused attention on the intricate problem of increasing the home output of agricultural produce in the event of war and the spate of criticisms and approvals of the Government's attitude in the matter was not therefore unexpected. As publicly announced, the Government has made plans for expanding the home production of food, which will be put into operation directly a state of war-time emergency arises. This is a plain statement of fact which has to be accepted and, as complete details of the plans are not to be made public, there is little ground on which to base either criticism or approval. But, whatever the Government's plans to meet a future emergency may be, in the meantime the country is in reality becoming less and less self-sufficient in food production as a whole. Within a year of the inauguration of the Land Fertility Scheme, applications were made for a total of 1,535,000 tons of lime and 459,000 tons of basic slag. The scheme thus appears to make a wide appeal to farmers and there is encouragement for its extension. However comprehensive the plans for a future emergency may be, little good can come from allowing the area of non-arable grassland to increase in the interim.

Autarchy in Excelsis

CONDITIONS in Italy provide a marked contrast where efforts towards self-sufficiency have been redoubled. In reviewing recently the work of the past year, the Supreme Commission for Autarchy stated that in the production of foodstuffs Italy had gone a long way; in good years the wheat harvest is adequate for home needs. In other directions the position is not so satisfactory and the Commission decided to apply remedial methods which must greatly interfere with industry's independence. For instance, it was found that the textile industry was relying too much on natural fibres and not making full use of the artificial fibres available. It was determined that an obligatory percentage of artificial materials must be employed in the production of textiles intended for the home market. The supply of metals has come under close consideration and manufacturing processes modified in order to utilise the available ore deposits. But in the case of copper and tin substitution is held to be the only solution. Attempts are being made to use zinc and aluminium as substituents both in industry and for domestic purposes.

Dyestuffs in Prepared Form

By
J. WAKELIN

THERE is one aspect of dyestuff chemistry which up to now has received comparatively little consideration and general study, namely, the procedures adopted with a view to making dyestuffs convenient and available for use. The synthetic processes concerned with the manufacture of a compound which has colour and dyeing qualities is one subject, but the conversion of that compound into a readily available form is another and quite important consideration. It is only very rarely that a dye may be taken direct from the dye-manufacturer's crystallising baths or drying plant, and used in the dyehouse without intermediate treatment.

It is proposed in this present article to give some account of the steps that are taken with dyes to make them more adapted for use, since it is felt that this topic has hitherto not received the attention which is due to it.

There are many classes of dyestuffs and their modes of application to textiles or other materials differ fairly widely. Where the method of application is comparatively simple and inexpensive in operation the services of the preparer are not so much in demand, but in the case of the vat and azoic dyes whose procedure of application involves a number of different steps, a dye composition which is stable in storage yet amenable to ready application when wanted, may save much time and money for the consumer and justify the efforts of those who " prepare " it. It will also be appreciated that these latter dyes possess high fastness qualities which make their use very desirable, but in their disfavour is the relatively complex method demanded in their application. The dye preparations constitute an attempt to enable the dyer or user of dyes to achieve the fastness properties associated with the very fastest dyes with the minimum trouble in the processes of their application. As will be gathered later many other considerations enter into the question.

Preparing Prior to Sale

All commercially available dyes have to undergo some degree of doctoring, small or great. If only in the interests of uniformity between one delivery and the next, the manufacturer must often make some addition and correction, otherwise successive batches from the same maker might vary as much as one batch from the plant differs in shade and colour-strength from the next. In this sense all commercially available dyes are " preparations " for even acid and direct cotton dyes contain a proportion of dextrine or Glauber's salt. But here the analogy with dye preparations ends. Beyond ensuring that a given weight of dye powder provides a known amount of colouring matter, these additions serve little purpose; they do not contribute, so far as is known, to the stability of the product.

As stated, dextrine is a fairly common ingredient in technical dyes, its purpose being that of diluent. The I. G. Farbenindustrie, however, report that water soluble substances obtained by the incomplete hydrolytic degradation of wood by mineral acids are superior to dextrine and that the resulting dyes give purer and brighter shades. Wood is treated with hydrofluoric acid when it yields finally a slightly yellow amorphous powder which may be admixed with dyes, as for example, Crystal Violet, up to 95 per cent. of the whole.

When one attempts to dissolve dyes in water prior to using them, they sometimes form a sticky mass which almost resists further dissolution. Some contribution towards preventing this is found in a proposal by the American Du Pont de Nemours to convert the dye into flakes or platelets which also do not " dust." Their procedure is first to suspend the colouring matter in triethanolamine and to dry the suspension on a rotary drum drier. Chrysiodine, Metanil Yellow and other less familiar dyes are cited in the patent specification and the process appears to be extensible to include sulphur and vat dyes.

A dye which is to be offered at a low cost can hardly be expected to receive a lot of special preparing treatment, and so consideration of the commoner and less expensive bodies will be omitted in order to consider the vat colours and azoic dyes where the " preparing " treatment has much more scope and advantage. The vat dyes, speaking generally, are insoluble in water but on chemical reduction with hydrosulphite they are converted into the leuco form when they may be dispersed or dissolved in alkaline solutions and applied to textiles. Subsequently the impregnated material need only be oxidised gently to bring about the recovery of the coloured, insoluble form of the dye, the insolubility then contributing very materially towards the ultimate fastness to washing of the dyed fabric or yarn.

Preparations for Simplifying Vat Dyeing

This sequence of operations is quite a practical proposition and is carried out daily in numerous commercial dyehouses. All the same, much skill and intelligence is called for in its regular execution and it is to be expected that invention has been applied to this process in order to make it easier and less prone to errors or misjudgments.

Since hydrosulphite is invariably employed in this process, the I. G. Farbenindustrie have a patented preparation which contains both this and the dye as well. Such mixing of the essentials prior to use might seem an obvious step, but too premature a bringing of the reactants together sometimes leads to their reaction while in storage. The patentees report, however, that according to their invention, the vat dye, hydrosulphite, trisodium phosphate and a wetting agent mixed yield a preparation which is stable to air and yet dissolves readily in warm water to give clear vats suitable for dyeing viscose rayon. The dye may be tetrabrom-indigo or benzoyl-amino-anthraquinone and the wetting agent may be isobutyl-naphthalene sulphonate. The latter wetting agent is one which is very chemically stable to acids, alkalis and salts, being typified by the proprietary bodies "Nekal" (I. G. Farbenindustrie), and " Perminal W " (I.C.I.). The sulphated fatty alcohols might not be so satisfactory since they contain a hydrolisable ester group.

The introduction of wetting agents into dye preparations is likely to be a fairly general practice since ease of dissolution of the dye principle is obviously one desideratum in their use. On looking through the patent literature it is seen also that one wetting agent appears to find favour above others, even above the alkyl naphthalene sulphonic acids already referred to, namely, the condensation product of formaldehyde and naphthalene sulphonic acid. Imperial Chemical Industries have a patent in which they make a dye preparation from Durindone Blue 4BC (Colour Index 1184), by first dissolving the dye in strong sulphuric acid and pouring the solution on to ice and water. The precipitated matter is filtered, washed and made just neutral with soda and is then milled with this condensation product.

Vat Colour Powders for Paper

The Du Pont Company of America obtain vat colour powders for dyeing paper by mixing tetrabromindigo, or else dichloriso-violanthrone in paste form, with dextrine and an aqueous solution of the formaldehyde-naphthalene sulphonic acid condensation product. The mixture is dried and ground and is used to dye paper by incorporating it with bleached pulp into the beater with size and sulphate of aluminium.

This wetting agent from formaldehyde and naphthalene

sulphonic acid is by no means a new discovery, being mentioned in patents of some ten years ago in the same connection. Unfortunately, very little data about it are available but one is justified in believing that it must resemble the other alkyl naphthalene sulphonic acid compounds. It may be made by heating naphthalene with sulphuric acid monohydrate at 160° C. for 10 hours, diluting, and heating for a further six hours at 95° to 100° with an addition of 40 per cent. formaldehyde. The mass is cooled, treated with lime and the alkali metal compound derived from the calcium salt by precipitation of the carbonate of lime.

The formation of dyes within the textile fibre by means of the twin process of diazotisation and coupling is made known to most of us in our student days. Thus, aniline when treated with sodium nitrite and cold mineral acid yields the diazonium salt of benzene which may be made to combine with a phenol or naphthol to give an azo compound which if not a useful dye, is typical of others that are. In practice, simple naphthols are not used; preference is given to derivatives of naphthol which possess a natural affinity for the cotton fibre, *e.g.*, oxynaphthoic acid anilide, and so forth.

The ideal is to form within the interstices of the fibre an insoluble dye. To obtain this, negatively substituted amines are employed as basic constituents but these are not very soluble themselves. This may cause difficulties in the dyehouse. Again, the complexity of the process, the making up of nitrite and other necessary ingredients takes time and trouble and, because of this, search has been made for ways and means of making stable diazo preparations which do not require elaborate preparatory treatments.

Method of Forming Stable Diazo Preparations

One comparatively successful method is to treat a diazo compound in neutral or alkaline condition with sodium sulphite when the diazosulphonate is formed: $R—N=NSO_3Na$. Such a product may be found in commerce as a sparingly soluble orange or red substance which is stable in alkaline media but which readily gives a diazo solution when introduced into dilute mineral acid solution. Compositions of this type also contain a little chromate or other neutral oxidising agent which is necessary in order to obtain full development. A patent to Imperial Chemical Industries, Mendoza and Murray prescribes as a suitable stable diazo preparation, the diazosulphonate of 4-chlor-2-toluidine mixed with potassium bromate, anhydrous sodium sulphate and dry sodium formaldehyde-naphthalene sulphonate.

It may be of general interest that certain members of the Variamine and Rapidasol series of stable diazo salts are diazo sulphonates. All, of course, require to be coupled with a naphthol to get the colouring matter but none of the usual tedious steps required in ordinary diazotising, *e.g.*, adding nitrite, etc., are necessary.

An advance on this proposal is seen in a patent to Du Pont de Nemours in which it is reported that not only the diazotisation ingredients, *i.e.*, base, nitrite, etc., but also the naphthol may also be included in one composition. Thus, there is first prepared the diazoimino compound by coupling methyl glucamine with 4-chloro-2-toluidine. Some word of explanation is necessary. A diazoimino compound is formed by coupling a diazonium salt and an amine in the presence of a limited amount of acid, the configuration of the product being $R—N=N—NH—R_1$ in the case of a primary amine and $R—N=N—N\ R_1R_2$ in the case of a secondary amine (such as methyl glucamine). Such a compound still retains the potentialities of the diazonium salt which is made active by treatment with acid, but remains inactive as long as alkaline. This, then, is a stable form of a diazonium salt suitable for making up dye preparations. Diazoimino compounds are sometimes inclined to have poor solubility in water but to overcome this, the component amine is chosen for its water-solubilising groups. Glucamine is, of course, an amine related to glucose and possesses many hydroxy groups. The methyl substituted nitrogen renders it a secondary amine and prevents the free hydrogen from wandering with the possible formation of unwanted aminoazo compounds.

4.185 parts by weight of this diazoimino compound, then, are mixed with 2.815 parts of the ortho-toluidide of 2 : 3-hydroxynaphthoic acid. (The latter is a naphthol of the same type as Naphthol AS having an affinity for cellulose.) 7 parts of glycol monoethyl ether are added and 12 parts water together with 3 parts of 30 per cent. caustic soda solution. After heating this mixture to 140° F. to bring all ingredients into solution, it is cooled and added to 50 parts of "ST thickener" and a further addition is made of 20 parts sodium monochloracetate. (The thickener is a mixture of tragacanth and starch paste.)

The print paste so prepared is ready for use and the application to cotton fabric is simplicity itself. After printing from an engraved copper roller, the fabric is dried in air and then subjected to live steam for five minutes by passage through a Mather-Platt vat colour ager. It may be assumed that the chloracetate liberates acid which breaks down the diazoimino compound setting free in active form the diazonium compound of 4-chlor-2-toluidine which immediately couples with the naphthol compound already attached to the fibre. The fabric, it is stated, emerges from the ager having a bright red printed pattern upon it which possesses very good fastness properties.

INSTITUTE OF CHEMISTRY EXAMINATION RESULTS

THE Institute of Chemistry of Great Britain and Ireland has announced the following pass list for its September examinations:—

Examination in general chemistry for the Associateship: John Pratt Allchin (Central Technical College, Birmingham), Arthur John Blake (The Polytechnic, Regent Street, London), Cyril Josiah Bloomfield (The Polytechnic, Regent Street, London), Robert Archibald Cowin (Harris Institute, Preston), William Grossart Ferguson (Royal Technical College, Glasgow), Alan Robert Fraser (City Technical College, Liverpool), Hugh Grant Macpherson Hardie (Heriot-Watt College, Edinburgh, and Robert Gordon's College, Aberdeen), John Love (Paisley Technical College), James McLaren Malcolm (Royal Technical College, Glasgow), Ralph Frederick Reynolds (College of Technology, Leicester), Stanley McFeat Robertson (Royal Technical College, Glasgow), Ezra Shamash, B.Sc. (Lond.) (University College, Hull), Arthur Dennis Stephenson (Leeds College of Technology), William Hedley Swire (Wigan and District Mining and Technical College).

Examinations for the Fellowship: Martin Luther Hughes, B.Sc. (Lond.) (inorganic chemistry, with special reference to the manufacture of steel); Jack Leake Pinder, B.Sc. (Lond.), Henry Geoffrey Smith, B.Sc., Ph.D. (Leeds) and William Hugh Templeton, B.Sc. (Lond.) (the chemistry, including microscopy of food and drugs, and of water); William Ian Maxwell Holman, B.Sc. Agr. (Sydney) and Douglas Everard Vernon Koch, B.Sc. (Lond.) (agricultural chemistry); Douglas Howard Lloyd (in metallurgy, with special reference to iron and steel).

THE Grand Union Canal Co. have secured the agency for a new all-water transport service between Great Britain, Canada and the United States of America. The new service, the first vessel of which will leave London en route to St. John's, Newfoundland, St. John, New Brunswick, and possibly Halifax, Nova Scotia, between January 6 and January 12 inaugurating the winter service, combines with the Grand Union Canal Co.'s undertaking between London, Birmingham, Leicester, and other midland centres to offer, for the first time in the history of shipping, an all-water route, not the least advantage of which is the transportation of fragile merchandise from the heart of industrial England to Canada and the United States of America.

Analytical Work of the Government Laboratory

Increased Number of Samples Examined—Annual Report of the Government Chemist

ACCORDING to the report of the Government Chemist upon the work of the Government Laboratory for the year ending March 31, 1938 (published by H.M. Stationery Office. 9d.), the total number of samples examined in the course of the year, including those dealt with at the Chemical Stations, was 562,549 as compared with 545,233 in the preceding year, an increase of 17,316. Compared with the numbers of samples examined last year, there are decreases of 8,000 in the samples of wines, 2,000 in samples of cocoa and chocolate, 2,600 in samples taken under the Import Duties and Ottawa Agreements Act and 2,000 in samples taken under the Safeguarding of Industries Act. Samples of tobacco increased by 27,000 and there are increases in Air Ministry samples, imported spirituous preparations and in silk samples.

The work for the Board of Customs and Excise in the main comprises the examination of samples in connection with the assessment of duty and drawback, or with the regulations relating to the manufacture and sale of dutiable articles Samples taken from imported goods in connection with the administration of the Import Duties Act, Ottawa Agreements Act, Safeguarding of Industries Act, the Dangerous Drugs Act, the Dyestuffs (Import Regulation) Acts, and samples of tea taken by the officers of customs and excise on importation under the Sale of Food and Drugs Act, 1875, of imported dairy produce taken for the Ministry of Agriculture and Fisheries and the Ministry of Health in connection with the administration of the Food and Drugs (Adulteration) Act, 1928, the Public Health (Condensed Milk) Regulations, 1923, and the Public Health (Preservatives, etc., in Food) Regulations, are also sent to the Laboratory for analysis.

Examination of Dyestuffs and Intermediates

The Dyestuffs (Import Regulation) Acts, 1920 to 1934, prohibit the importation, except under licence, of (*a*) synthetic organic dyestuffs (including pigment dyestuffs), whether soluble or insoluble; (*b*) compounds, preparations and articles manufactured from any such dyestuffs except any such as are not suitable for use in dyeing; (*c*) organic intermediate products used in the manufacture of any such dyestuffs. Thirty five samples were examined to ascertain whether they fell within these prohibitions.

In the administration of the Hydrocarbon Oils Duty it has been necessary to examine a large number of imported goods to determine the duty payable, and of exported goods to check the declarations of the traders making claim for drawback in respect of duty-paid oils used as ingredients in the manufacture or preparation of the goods in question. The total number of samples examined was 14,447, of which 8,616 were imported and 5,831 from exported goods. Of that total 8,153 were hydrocarbon oils, the remainder being miscellaneous composite goods, such as enamels, lacquers, leather colours, paints, varnishes, garage preparations, road dressings, solvents, insecticides, medicinal and toilet preparations, essential oils, lubricants, printing inks, etc. Among miscellaneous investigations connected with the duty may be mentioned the analysis of waste sludge oil from shipbreaking yards, the identification and assessments of the duty rating of wrecked goods, and examination of oils produced by recently introduced processes such as special distillates from vegetable oils, and material from the "synthetic oil" installations.

Hydrometers for ascertaining the strength of spirits or the specific gravity of hydrocarbon oils, saccharometers for use at breweries, distilleries and glucose factories, sets of weights for use in the collection of the silk duties, thermometers and graduated vessels of various descriptions are tested at the Laboratory as to their accuracy before being issued to the Officers of Customs and Excise. During the year 2,202 such tests were made. The department is also responsible for the custody and maintenance of the principal reference spirit hydrometers. The use of the new Tate Saccharometer designed in this laboratory is being gradually extended in the Customs and Excise Department with satisfactory results. Approximately eight hundred have now been calibrated and issued.

During the past year, 7,281 samples were examined under the Safeguarding of Industries Act (including 34 samples for dyes) the object of the examination being to ascertain whether the product consisted of one or other of the listed chemicals or the ascertainment of the amount of listed chemicals contained in the preparation in question. 43 samples were examined in connection with claims for drawback of the duty on exportation.

Materials for Methylating

Eight hundred and sixty-six samples of wood naphtha, as well as other crude methyl alcohol and mineral naphtha, and 248 samples of pyridine and dyes intended for use in the manufacture of methylated spirits, were examined. Except in 15 instances the materials represented by the samples were approved as fit for methylating purposes.

For the purpose of controlling methylated spirits or spirits other than methylated spirits used free of duty in connection with manufacturing operations, 3,241 samples of special denaturants, specially denatured alcohol, recovered spirits, residues from stills and articles manufactured with industrial methylated spirits and duty-free spirits, were examined. In one instance of the sale of methylated spirits without the necessary excise licence, legal proceedings were attended and a conviction obtained.

Three thousand one hundred and seventy-four papers were dealt with relating to applications to the Commissioners of Custom and Excise either (1) in respect of claims for rebate of duty on alcohol used in making medicinal preparations or for scientific purposes; (2) in connection with permission to receive industrial methylated spirits and/or other forms of duty-free alcohol for use in manufactures, tuition and research; or (3) miscellaneous questions. The other references dealt chiefly with the question as to whether the proposed use of the alcohol was, from the chemical point of view, such as to justify the granting of the particular indulgence asked for. Technical advice was also given in connection with the denaturing and control of duty-free spirits.

Potable Methyl Alcohol

Methyl alcohol, either as wood spirit, which consists mainly of methyl alcohol, or synthetic methyl alcohol, is not liable to spirit duty on importation unless it is purified so as to be potable, and it is then charged as ordinary spirits (Spirits Act, 1880). Synthetic methyl alcohol and methyl alcohol (R grade) are liable to Key Industry Duty. Of 49 samples of imported methyl alcohol, 2 were found liable to duty on the grounds of potability.

Whether imported or home produced, fusel oil generally contains ethyl alcohol as an impurity, but duty is not charged on such ethyl alcohol unless upwards of 15 per cent. of proof spirit is present. Forty import samples were examined for this purpose, and one was found to contain ethyl alcohol in excess of this limit. Fifty-five samples of fusel oil from British distilleries were examined. Of these, 27 were found to contain more than 15 per cent. of proof spirit, and delivery out of revenue control was refused until the proportion of spirit had been reduced.

Sugar and its asscíated by-product, molasses, are liable to

duty when imported or when produced at a beet sugar factory. Glucose and artificial sweeteners such as saccharin, whether imported or of British manufacture, are also dutiable. The samples of sugar itself, from all sources, numbered 22,016 of which 868 were from beet sugar factories. Samples of preparations containing sweetening matter, or examined for sweetening material, numbered 52,996, of which 45,689 were from imported goods. This number does not include those samples which contained cocoa or spirit in addition to sugar.

In connection with the assessment of duty on British-made glucose, 265 samples were taken during the course of manufacture; 887 samples of glucose itself or composite articles containing it were examined for assessment of drawback on exportation; there were, in addition, 56 samples of imported glucose and of glucose used in syrups made at refineries.

Saccharin has to be searched for in preparations in which there is any probability of its occurrence; 102 samples of imported substances were specially examined with this object, and in a large proportion saccharin was present. Most of the samples contained some other dutiable ingredient such as sugar, spirit or chloroform, and this had also to be determined. 581 samples of saccharin and articles containing saccharin were examined for the purpose of assessing the amount of drawback payable on exportation, and 81 samples of saccharin and of the materials used in its production were likewise examined in connection with the assessment of duty on saccharin manufactured in this country.

Death of Sir Robert Mond

Famous Research Worker and Egyptologist—A Pioneer Investigator of the Metallic Carbonyls

SIR ROBERT LUDWIG MOND, F.R.S., distinguished by his contributions to chemical and physical science and by his work as an Egyptologist, died in Paris on October 22 at the age of 71.

Born at Farnworth, near Widnes, Lancashire, he was the elder son of the late Dr. Ludwig Mond, F.R.S., one of the founders of the Brunner Mond Co. He was educated at Cheltenham College, at St. Peter's College, Cambridge, at Zurich Polytechnic, and at Edinburgh and Glasgow Universities. He was Hon. LL.D. of Liverpool and Toronto, F.R.S. (Ed.), F.S.A., F.Ph.S., F.G.S., F.C.S. and F.Z.S.

His Work for Brunner Mond and Co.

As a schoolboy Sir Robert familiarised himself with the workshops of the Brunner Mond Co. at Widnes. After the completion of his education he became assistant to Sir William Thomson, afterwards Lord Kelvin, at Glasgow, and subsequently spent two years at Winnington, studying the process worked there by Brunner, Mond and Co. While also at Winnington he acted as works chemist and assisted his father in many developments, including the manufacture of electrolytic zinc, the Mond gas producers and the ammonium chloride process. He also collaborated with his father in discovering the gaseous metallic compound nickel carbonyl and in investigating its properties, a work which led to the Mond carbonyl process for refining nickel. As chairman of the Mond Nickel Co. in 1919 he was primarily responsible for initiating the enterprise of separating and refining the platinum metals from the end-products of the Mond carbonyl process.

Following Dr. Ludwig Mond's death in 1910, Sir Robert moved to Combe Bank, Sevenoaks, where, with much of his father's laboratory equipment to which he had added considerably, he continued to study matters relating to the metallic carbonyls. All aspects of agriculture also aroused his interest and led to his experimenting with crops and fertilisers on the arable lands of his model farm and dairy, the products of which were subject to continuous bacteriological and chemical examinations in his laboratory. It was at Combe Bank that methods for the industrial production of iron carbonyl were perfected. Sir Robert and his assistants also discovered the first derivative of a metallic carbonyl, i.e., cobalt nitroso-carbonyl, and a new ruthenium carbonyl.

Sir Robert was largely responsible for the planning and equipment of the Davy Faraday research laboratory founded by Dr. Ludwig Mond at the Royal Institution. He was hon. secretary of the laboratory, chairman of the Norman Lockyer Observatory Corporation, an associate foreign member of the Académie des Inscriptions et Belles Lettres in Paris, Messel medallist of the Society of Chemical Industry, past-president of the French Society of Chemical Industry and past-president of the Faraday Society. He had an active commercial connection with the chemical industry by being a director of the South Staffordshire Mond Gas Co., the International Nickel Co. of Canada, and the Mond Staffordshire Refinery Co.

Sir Robert's benefactions to enterprises of a scientific and philanthropic nature were frequent and generous. As a memorial to his first wife, formerly Miss Helen Edith Levis, he founded the Infants' Hospital in Vincent Square, Westminster, and was its honorary treasurer. In 1932 he presented a new dome and four cameras to the Norman Lockyer Observatory, Sidmouth. He was a benefactor also of French scientific societies, and in particular of the Maison De La Chimie in Paris, to which on one occasion he presented a cheque for 1,000,000 francs.

Sir Robert Mond

As an archæologist, Sir Robert had a considerable reputation, and his discoveries during 30 years' excavation in Egypt now enrich many museums and institutions. He discovered the secret of the beautiful blue dye which was used so often in early pottery and which had defied the efforts of modern craftsmen to reproduce.

Elder brother of the first Baron Melchett and uncle of the second Baron Melchett, who succeeded in 1930, Sir Robert was married in 1898 to Miss Helen Edith Levis, who died in 1905. There were two daughters of the marriage. He married secondly in 1922, Marie Louise, daughter of the late Mr. G. J. Le Manach, of Belle Isle en Terre, Brittany.

Spectrographic Analysis

Speed One of the Principal Advantages over Chemical Methods

DR. H. K. WHALLEY, of the Government Laboratory, in a lecture on the methods of spectrographic analysis before a recent meeting of the London Section of the Oil and Colour Chemists' Association, commented on the fact that in analytical chemistry a realistic modernity in attitude co-existed with a conservatism in practice. The development of physical methods, he believed, had been retarded by that attitude, and the progress of spectrographic analysis was a typical example. Only recently had spectrographic methods achieved some maturity, but they had taken more than twenty years to do so, though during that time no fundamental discovery—factual, technical or theoretical—had occurred. To-day, spectrographic analysis occupied a useful position in a small but significant selection of analytical laboratories.

Discussing the excitation of spectra and their characteristics, he said that the many sources of light employed for spectrographic analysis fell within three groups—flame, arc and spark. Lundegardh's method was a good example of the use of the flame. The material to be analysed must be in the dissolved state, and the solution was sprayed into the air supply of an air-acetylene flame. By rigorous control of all variables—the air and gas pressures, the conditions of spraying, the time of exposure, etc., a high accuracy, of from 2 to 5 per cent., had been claimed. One of the chief sources of error was the small variation in sensitivity of different parts of the photographic plate. The air-acetylene flame was hot enough to excite the atoms of 32 elements sufficiently to give the characteristic emission lines of the unionised atom.

Both the arc and the spark were extensively used, and though in general the spark was to be preferred because of its higher degree of reproducibility and control, the arc had its own field of utility. The arc, which was obtained by connecting two electrodes to a source of D.C. and "striking" by bringing the two electrodes into contact and separating again or by making momentary contact with a third piece of metal, was often more sensitive than the spark for very small quantities of material. The spark was usually produced by a high-tension (10,000-20,000 v.) A.C. discharge between the two electrodes. A condenser across the spark gap and an inductance in series with it comprised a simple circuit which was often adopted. The particular values of the capacity and the inductance determined the nature of the spark and offered two controllable variables. The choice between the arc and the spark was determined by the nature of the material to be examined, the elements sought for and the suitability for observation of lines due to the unionised and ionised atoms predominant in the arc and spark respectively.

Qualitative Analysis

The wavelengths, and also the relative intensities under specified conditions, of the lines making up the spectrum of any element were as characteristic of that element as were the atomic weight, the melting point or any other fundamental physical property. Dealing with qualitative analysis, Dr. Whalley said that if a spark were struck between two electrodes of, say, aluminium, the spectrum obtained consisted of some hundreds of lines of different intensity. If then the amount of aluminium in the spark were reduced, by using, for example, electrodes of an alloy containing only 10 per cent. aluminium, then both the number and the strength of the aluminium lines were reduced. If the amount of aluminium were then cut down to 1, then 0.1 and then 0.01 per cent., and so on, more and more aluminium lines disappeared from the spectrum, and the intensity of those remaining was progressively weakened. The lines which persisted in the spectrum down to the limit of sensitivity were "persistent" lines, and those lines were most frequently used in qualitative analysis.

Though metals, alloys and other solid electrical conductors offered in themselves suitable electrodes, non-conducting powders such as glasses, precipitates, frits, pigments, ashes, etc., might be volatilised or disrupted in the arc or spark by using auxiliary electrodes. They were commonly of carbon, copper, silver or aluminium, and the material to be examined was placed in a cavity in the top of the lower electrode.

The spectrographic identification of elements in a substance, said the author, was free from the uncertainties which not infrequently accompanied chemical methods, and its value in detecting the rare and the unexpected was unrivalled.

Quantitative Methods

With regard to quantitative analysis, he said that the fact that the lines of the spectrum gradually disappeared as the concentration of the element producing them was reduced could form the basis of a roughly quantitative visual method. Some modification of the internal standard method of Gerlach was most generally employed. The internal standard method relied upon the comparison of lines due to the impurities (or minor constituents) to be determined with lines due to the major constituent in the same spectrum, both series of lines being produced at the same time and in precisely the same conditions. Equality of intensity of certain pairs of lines (one of the element to be estimated and the other of the major constituent) were correlated with percentage impurity.

After illustrating by means of a table the use of the method in determining iron in commercial aluminium under standardised sparking conditions, he said that in general an accuracy of ± 10 per cent. was usual, though the possibility of a somewhat higher error could not be excluded. An essential condition for the employment of that method was that a sufficient number of major constituent lines of suitable intensity should exist to serve as internal standards with which impurity lines might be compared. Aluminium alloys, tin, lead, copper, iron, and nickel satisfied that condition in varying degrees, while magnesium and zinc alloys, for example, which had relatively simple spectra, did not. That difficulty could be surmounted by one of two methods. Smith superposed on the spectrum of the zinc sample a tin spectrum which supplied lines of suitable intensity for comparison with impurity lines in zinc; the same principle was used in the analysis of certain aluminium alloys, an aluminium alloy containing 1 per cent. nickel supplying the auxiliary reference spectrum. Another method, involving the use of a composite spark, had been used satisfactorily for magnesium alloy analysis. The method consisted of striking a spark between one electrode of the alloy to be analysed and another of pure nickel. The composite spectrum so obtained consisted of the spectrum of the alloy and the nickel spectrum, from the many lines of which suitable internal standards could be chosen.

For any visual method, however, whether with internal or external standards, he would hesitate to claim an accuracy better than ± 10 per cent. By averaging many determinations, a higher accuracy might be claimed, but that removed one of the chief advantages of the spectrographic method, i.e., its speed.

There was little doubt, however, that reduction of errors, without the sacrificing of any inherent advantage, had been and would be effected by the use of photometric methods. Discussing such methods, he described a typical apparatus for the measurement of the intensity of blackening due to spectral lines. A source of light was focused by a

condensing lens on the portion of the plate under examination. The light then passed through a microscope objective and the enlarged image of the spectrum was thrown on the face of a photo-electric cell fitted with a slit, preferably adjustable. The lamp, condenser, plate carrier, objective and cell were all mounted on an optical bar. The cell was connected to a moving coil galvanometer used in conjunction with a lamp and scale. The plate carrier was designed so that two movements could be given to the plate, a coarse vertical movement to bring different spectra into the field of illumination and a fine lateral movement so that any portion of the image of the spectrum—as, for example, a particular line—might be made slowly to traverse the slit of the cell. The minimum deflection of the galvanometer, which coincided with the region of maximum blackening of the plate, was a measure of the density.

Since, other things being equal, the higher the percentage of a constituent present, the stronger were its lines, if a series of exposures absolutely identical in all respects could be made of a number of alloys or mixtures, the composition of some of which were known, then by measurement of the intensity of a single line due to a particular constituent, the percentage of that constituent present in the unknown mixtures could be determined by interpolation. Absolute identity of successive exposures, however, was not obtainable, and as in certain visual methods, so in measurement methods some form of the internal standard principle was used to counter that difficulty.

In conclusion, he said that the speed of any spectrographic method was one of its chief advantages. Further, though the accuracy of spectrographic analysis might be, in certain of its applications, of no high order, it was free from major errors.

Discussion

The Great Possibilities of Spectrographic Methods—Cost of the Equipment—Some Applications in the Paint Industry

The Chairman (Dr. J. O. Cutter) after complimenting Dr. Whalley on his lecture, said that certain estimations, which were considered by many analysts in the industry to be relatively simple, had actually been carried out by spectrographic methods. For instance, the estimation of lead and manganese in ordinary ready-mixed paints had been made spectrographically in a comparatively short space of time; the work involved in making such an estimation even reasonably accurately in the ordinary way could occupy about two days.

Mr. Noel Heaton (Past-President of the Association) remarked that the lecture opened one's eyes to the great possibilities of the development of spectrographic methods, which produced results much more rapidly than chemical methods. It had been stated by the author that in the application of some of the methods described one could not expect an error less than ± 10 per cent. At the same time, it would be appreciated that very rarely in rapid routine work did one require much higher accuracy than that, and that the time saved at the expense of a little accuracy was well worth saving. There should be an immense future for spectrographic analysis.

Dr. H. W. Keenan commented that in spectrographic analysis a lot seemed to depend upon the standards to which Dr. Whalley had referred, and he asked exactly how those standards were prepared. The paper had aroused his enthusiasm to the point at which he was tempted to ask the cost of the apparatus necessary for spectrographic analysis; he wondered whether financially it was within the compass of the ordinary industrial laboratory.

Dr. H. K. Whalley replied that most of the standards were obtained from routine samples and were analysed by the chemists on the bench. In 99 cases out of 100, those analyses were accurate and reliable, and they were checked by comparison with standards obtained from other analysts, so that any discrepancy was immediately spotted, and reanalysis could be carried out. The medium size spectrograph on which most of the work such as he had described was done would cost about £200, and in the Government Laboratory all the accessories, apart from the condenser, were home-made; accessories such as ordinary inductances, electrode holders, etc., could easily be made and did not involve expense.

The Chairman said he did not think it was fully realised that spectrographic analysis was being applied industrially to many materials, including paints. It was being used, for instance, where specifications demanded that the amounts of certain metals must be below certain limits, and it gave the answer certainly within three-quarters of an hour. Ordinary chemical analysis was not applied unless the spectroscope indicated that the amount of metal present was just near the stated limit. The saving effected in both time and money was very great indeed where spectrographic analysis was used; there was no question at all about the economic advantage, and he was prepared to prophesy that within the next five years spectrographic methods would be used much more widely than at present.

Mr. L. O. Kekwick asked for information as to the value of spectrographic apparatus for estimating small quantities of cadmium. Dr. Whalley replied that he had analysed spelters for cadmium in quantities up to about 0.2 per cent. Mr. Kekwick asked whether it could be estimated in quantities as small as 0.02 per cent. by spectrographic methods. Dr. Whalley said that that was done by the method he had described for estimating zinc and magnesium, i.e., taking three or more different exposures and measuring up the lines.

Dr. S. H. Bell expressed particular interest in the references made to the estimation of cobalt in lithopone and said that those concerned with the paint industry were greatly interested in the estimation of small quantities of driers, which explained the frequent references made to manganese. Apparently all that was necessary was to apply a paint to an electrode, and the information required could be obtained in a short time; if that were so, it was worth an expenditure of £200. He asked if Dr. Whalley would assure the meeting that, if a paint were applied to the hollowed out end of an electrode, one could estimate lead, manganese and cobalt, and possibly iron in small quantities, present together.

Dr. Whalley replied that there was no qualitative difficulty about interference by one element masking the other. The quantitative determination with high accuracy must be considered as a possibility, but he presumed that an accuracy of round about 20 or 30 per cent. might be sufficient for the estimation of small quantities of cobalt, manganese and lead. He had carried out some preliminary experiments of that kind and he would not say that it was quantitative yet. The paint must be painted on to the electrode, baked in an oven for about a quarter of an hour in order to take off the volatiles, and then dealt with as described in the paper. The method could be used for quantities of cobalt and manganese, but it was not yet quantitative for lead, though it was developing that way; if there were more lead in one sample than in another, the analyst would notice it. He would not say that to make the method quantitative was quite simple, but he did not think that it was by any means beyond the spectrograph.

Dr. F. W. Stoyle asked whether the technique of spectrographic analysis was easily acquired.

Dr. Whalley said that the technique of the routine analysis of large batches of the same sort of material could be acquired with very little trouble. Any reasonably intelligent person could pick up the technique; he personally had had no particular training in spectrographic work. One came to recognise in the course of time the different lines and could spot them immediately when examining the plates. He considered that ordinarily an industrial firm would be very wise to use a spectrograph, which would pay for itself in a short space of time.

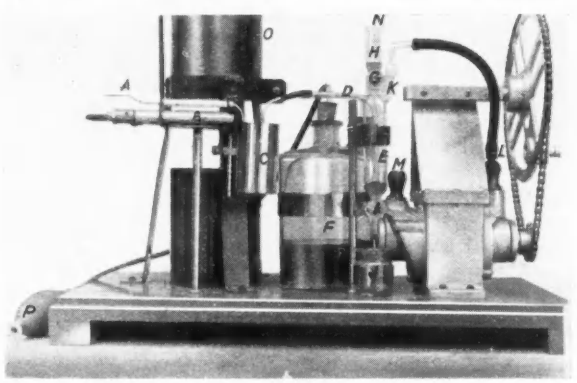
Chemical Work in A.R.P.

Recent Developments in France on the Detection of Gases

FROM A SPECIAL CORRESPONDENT

FROM the standpoint of the chemist, the most interesting work which has been carried on in France in connection with air raid precautions is concerned with the detection of toxic gases in the atmosphere and with testing the efficiency of filters in removing them. Much of this work has been done at the Paris Municipal Laboratory under the direction of the Principal, Dr. André Kling.

The latest apparatus designed by him is essentially an air pump which draws the air to be tested through a solution of bromophenol blue, which is bleached if toxic gases are present. The air is drawn in through a fine platinum tube (A), heated by an acetylene burner (B), and subsequently cooled by running the platinum tube through a water bath (C). The air is then admitted to the test tube (E) by means of the glass tube (D). The former consists of a tube about ¾ in. in diameter, closed top and bottom by cocks (G and I). Above the upper cock (G) a measuring funnel (H) is provided to measure out the reagent, while below the lower cock (I) a glass tube carries off the used reagent. The glass tube (D) runs down the centre of the test tube (E) and terminates



Dr. Kling's gas detector.

under the surface of a small quantity (about 5 c.c.) of the reagent contained in the test tube.

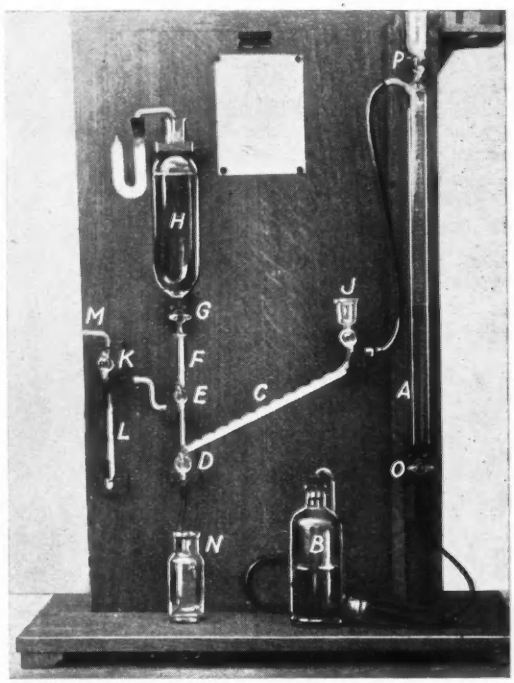
The air outlet of the test tube is by a glass tube (K) sealed into the wall of the test tube near the top. This is connected by rubber tubing to the intake (L) of the air pump so that when the air pump is operated, the air is drawn in through the platinum tube, bubbles through the reagent in the test tube, comes out by the top outlet tube and is forced out of the apparatus after passing through the air pump.

The reagent for the tests is carried in a large bottle (F) provided with two necks. In one of these is inserted a rubber stopper pierced by a short length of glass tube connected to a rubber bulb (P), in the other is a rubber stopper pierced by a longer glass tube (N) so arranged that when the rubber bulb is pressed, the additional air pressure in the top of the reagent bottle forces a quantity of reagent out by the glass tube (N), the reagent running into the measuring glass (H).

The time required to make a test is very short, as the only operations necessary are lighting the acetylene burner (B) (which is fed from a small reservoir of compressed gas (O)), pressing the bulb to force the necessary 5 c.c. of reagent into the measuring glass (H), turning the cock (G) which connects the measuring glass with the test tube to allow the reagent to run into the latter, and then turning the air pump.

Generally the test is carried out for about two minutes and if no bleaching effect is noticed, the atmosphere may be considered safe. Strong concentrations of gas bleach the bromophenol blue in a few seconds.

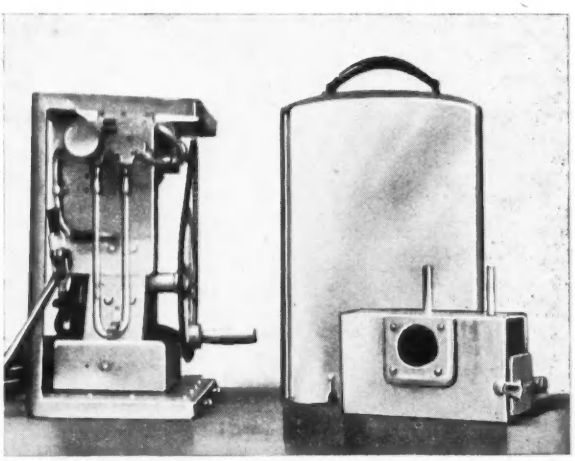
An apparatus for testing the presence of CO_2, and giving a measure of the quantity present in the atmosphere of an air raid shelter, consists of a long tube (A) marked off in



Apparatus for testing the amount of CO_2 in the air.

c.c. with a capacity of 1,000 c.c. The air admitted to the top of the tube is taken in from an inclined tube (C), one side of which is coloured white and partly filled with a N/2,000 solution of sodium carbonate tinted by phenolphthalein. The amount of air required to decolorise the solution is read off on the graduated tube (A) into which it is drawn, and the amount of CO_2 in the air thus determined.

In operation, the tap (O) is opened and the bottle (B) raised to fill the graduated tube up to the 1,000 c.c. mark. The tap is then closed. By opening



Apparatus for testing the efficiency of filters.

the tap (G) about 10 c.c. of reagent are run from the vessel (H) into the measuring column (F). A measured quantity of reagent is admitted to the tube by the tap (E). The three-way tap (K) is turned so that air from the inlet (M) flows directly into the tube (C). The bottle (B) is then lowered with the tap (O) open so that the liquid in the tube (A) drains out. Air is thus drawn in through the inlet (M) and bubbles through the reagent in the tube (C). As soon as this has been decolorised the tap (O) is closed and the level in (A) read. From this the percentage of CO_2 contained in the air can be calculated.

The efficiency of the filter in a shelter can be tested by another device. This consists of a small air pump which draws air through the filter to be tested and then through a small test tube containing bromophenol blue, and finally through a sheet of filter paper. A small furnace, in which a pastille containing methylene blue is ignited, is connected to the intake of the filter to be tested. At the same time a small quantity of chlorine is introduced into the intake, the pump of the testing device being operated all the time. If the filter under test fails to remove all the chlorine (tested for by the bromophenol blue) or if the filter paper shows traces of the methylene blue when moistened, the filter is faulty.

"Chemists and Cargoes"

Chairman's Paper at Opening Meeting of the S.C.I. Liverpool Section

AT the opening meeting of the session of the Liverpool Section of the Society of Chemical Industry on October 21, Professor T. P. Hilditch, the retiring chairman, introduced his successor, Mr. B. D. W. Luff, F.I.C., manager of the works laboratory of Lever Brothers, Port Sunlight, Ltd. Mr. J. S. Towers, the honorary secretary, reported that 24 new members had joined the section during the year and, allowing for losses through death and transfers, the total membership stood at 331. There were now only three associate members in the section. The chairman then presented the Leverhulme chemistry prize to Mr. William Basil Whalley, and the Liverpool section S.C.I. prizes to:—Mr. George White Brownlee (special merit prize); Mr. Joseph Michael Darcy (senior prize); and Mr. William Kenneth Matthews (junior prize).

In his address to the meeting, entitled "Chemists and Cargoes," the new chairman, Mr. Luff, said the association of chemists with cargoes began with the shipowner. When the ship was under construction the materials used were subject to inspection and testing in accordance with the specifications, in the drawing up of which the chemists would have previously collaborated.

When the actual construction is complete there will still be a varied assortment of stores, including paints, varnishes, wire and hemp ropes, packing and insulating material to be purchased, and here again these supplies will be required to be in conformity with specifications drawn up by the chemists.

The paints for the hull may be of different kinds, the under water part being given a foundation of anti-corrosive paint, this being followed by an anti-fouling composition. A special paint known as boot-topping is applied in a fairly wide band at the water-line where it will be subject to alternate wetting and drying.

The selection of paints is a matter of great importance, although it must be confessed that our knowledge of the subject is as yet inadequate. The proper application of a suitable anti-corrosive paint will be the surest means of securing a long life for the hull and it will ensure that fuel is not wasted in propelling through the waters a ship encumbered with adherent animal or vegetable growths.

Frequently the chemist acting for the shipping companies had to collaborate with the chemist representing the shipper in determining the conditions necessary for the carriage of certain classes of goods. In ships carrying bulk oils, for example, the captains must be furnished with data regarding the density and coefficient of expansion of each oil. Maximum and minimum temperatures to which the oils may be subjected during the transit or during loading or discharging must be fixed and adhered to, otherwise serious deterioration may occur.

It is possible by employing a creaming process to increase the content of rubber in latex from 35 per cent. to about 60 per cent. with a consequent reduction in the amount of water transported. The latex storage tanks which are a prominent feature of the Gladstone Dock, Liverpool, are a monument to a notable achievement, not only on the part of those connected with the production and utilisation of the latex, but also of the shipping company responsible for its transportation.

In ships carrying foodstuffs, and indeed in ships of all descriptions, the destruction of vermin is a question which demands the attention of the chemist. This is of particular importance in view of the increasing use of hydrocyanic acid as a fumigating agent. The highly poisonous nature of this gas necessitates that its use shall be carefully supervised and the chemist must ascertain that, after the operation has been carried out, the atmosphere is free from traces of the gas.

Reference was made to the work of chemists on whaling ships. Work of this character required the spirit of adventure and plenty of resource. It was not always possible to obtain such a rigid support for balances as on land. However, by suspending the balance in a gimbal, it is possible in reasonably good weather, to weigh to about one milligram. There is usually a good supply of tap water on board and distilled water is available, which, however, must be redistilled before it can be used satisfactorily for all purposes. With supplies of apparatus and reagents cut off, it is necessary to provide a good reserve and special precautions must be taken to see that the shelves are provided with fittings to prevent the contents rolling off in heavy seas. Apart from these minor points the work of the chemist on board the whaling factory ship is very much the same as if the factory were situated on land.

Discussing the work of the chemist when he acted on behalf of the purchasers of goods, Mr. Luff said he had to take into account the conditions of purchase. For some classes of merchandise the conditions may contain a clause in which the buyer has the option of rejection if a certain standard of quality is not attained. It is not usual to take delivery of such material until the tests are completed and the chemist must see that his results are available within the time allowed for the goods to remain on the quayside, usually from 48 to 72 hours after they have been landed, otherwise quay rent and watching charges will be incurred.

Mention was specifically made of oil cargoes and the claims that were sometimes made on the ground of inferior colour. The actual colour is ascertained at the time of receipt by the purchaser but it frequently happens that by the time a claim has been made and the matter referred to an independent chemist, some time will have elapsed. If, in the meantime, the sample in the possession of the seller's representative has been kept in a place where it is exposed to light, bleaching will have taken place, and the colour appear to be much better than has been stated by the claimants. It is well therefore for the buyers to retain a sealed sample and keep it in the dark until the matter has been settled.

Recent Trade Literature

Floors which are laid with acid-resisting flooring compound as supplied by H. WINDSOR AND CO., LTD., are claimed to have greater mechanical strength, greater resistance to abrasive wear and greater resistance to disintegration from mechanical causes, than concrete. Hydrochloric, phosphoric, formic, citric, lactic, sulphuric, nitric and acetic acids, in concentrations up to middle strength cannot damage such a floor, which also remains impenetrable to water, salt solutions and alkalis, even under high pressure. Further particulars of the qualities which are afforded by these floors are outlined in a recent leaflet.

The filtration of beer is a process calling for exceptional refinements of operation, and according to a new leaflet (Sec. 1) of the METAFILTRATION CO., LTD., the Metafilter is well adapted to meet these demands. Such filters are built with a wide range of outputs varying from 1 to 100 barrels per hour. Beer, however, is not the only liquid for the filtration of which the Metafilter has exceptional advantages. Economy in running costs is secured by greatly reduced charges for steam; in addition, there is no pulp to buy and the labour concerned in running and cleaning the filter is a mere trifle in comparison with what is normally expended. The filter can be in service for 95 per cent. of the day if desired.

WALLACH BROS., LTD., are makers of the "Evertrusty" range of safety appliances, and their general catalogue of 60 pages should be studied by all concerned with the safe running of chemical plant. They supply industrial gas masks of many patterns, which can be used in conjunction with various types of canisters to give special protection against certain gases; for instance, canisters are supplied to give safety in the presence of phosphuretted hydrogen and arsenurated hydrogen. Hoods and masks, goggles, face shields, gloves, clogs and boots, as well as first aid appliances and fire extinguishers are illustrated in profusion. On page 52 of this catalogue there is a useful appliance for the safe emptying of carboys of acid. All-rubber cushion knee-pads are a novel production for which a special leaflet has been issued.

ESCHER WYSS ENGINEERING WORKS, LTD., publish a quarterly bulletin called the "Escher Wyss News." Their products include water turbines, pumps, pipe lines, steam turbines, turbo-compressors and propeller-type blowers, evaporating plant, refrigerating machines, and centrifugal separators of fully automatic type for drying, separating and cleaning of sludge, salts, starch, cellulose, chemicals, etc. A recent issue of the "Escher Wyss News" has an article upon a scraper-type centrifugal separator which is claimed to have many improved features. It is stated that in the centrifuging of bicarbonate in soda factories, for which very large separators are employed to meet the required output, filling efficiencies of 70 per cent. to 80 per cent. can be obtained. The capacity of these machines is approximately 10 tons of centrifuged bicarbonate per hour, the separating process lasting about 20 minutes.

Various items of evaporating and filtering plant which are offered particularly to the chemical trade are illustrated on leaflets No. 161 to 169 of the MIRRLEES WATSON CO., LTD. Their productions include single-pass evaporators for concentrating delicate solutions and chemical trade liquors generally. The special features of these evaporators are single passage and rapid flow of liquid resulting in short exposure to heating surface, limited maximum temperature, straight tubes giving easy access for cleaning, and steam economy of double and triple effects. Vacuum pans are supplied for the rapid low temperature concentration of syrups and extracts. The company also makes low-pressure vertical tube evaporators to produce pure distilled water vapour for process requirements and for boiler feed make-up. The Vallez rotary filter is claimed to give very brilliant filtrates in the refining of sugar (both cane and beet), the manufacture of syrups, treatment of fruit juices and filtering of chemicals, oils, etc.

Personal Notes

MR. HENRY ROBERT HISCOTT, London and general sales manager of Le Bas Tube Company, Ltd., has been elected to the board of directors of the firm.

MR. HARRY GORDON WESSON, aged 53, a director of W. Weston and Co., Ltd., steel manufacturers, of Wednesbury, has left £41,088, net personalty £38,028.

MR. E. P. WOODS has been appointed to succeed Mr. G. B. Fiddes, as deputy engineer in charge of the Aylestone Gasworks. Mr. Fiddes retires shortly on superannuation.

MR. W. COOPER, of the laboratory staff of the British Aluminium Co. at Burntisland, has been made a presentation by his colleagues on the staff on the occasion of his marriage.

CAPT. H. FITZHERBERT WRIGHT has been appointed chairman of the board of the Butterley Co., Ltd., in succession to the late Mr. A. Leslie Wright. MR. E. FITZWALTER WRIGHT has been appointed managing director.

OBITUARY

MR. JOHN WILLIAM FORD, manager to the Bolsover Gas, Light and Coke Co., Ltd., for the past 25 years, died at his home in Bolsover at the age of 65.

MR. EDWARD EDISON STONES, who retired in May last from the assistant general managership of Glasgow Gas Department, a post he had held since November, 1920, died recently in Glasgow, at the age of 59.

Foreign Chemical Notes

Finland

THE TEKNILLINEN TEHDAS SAVU O/Y of Helsinfors (capital 100,000 Finnish marks) has been formed to manufacture and market plant-protective agents and pesticides.

Japan

AMMONIUM CHLORIDE FOR FERTILISERS will be made in Japan for the first time by the Japanese Nitrogen Fertiliser Company at Hommiya (Korea). Although the Korean Administration has approved of the use of ammonium chloride in fertilisers, its use in Japan proper is still prohibited.

Holland

SILICON CARBIDE IS BEING PRODUCED IN POLAND for the first time by the Elektro Company of Lazioka Gorne.

A NUMBER OF UREA DERIVATIVES are now being manufactured on the technical scale by the Botuta Company. Among them is 7,7-disulpho-5,5-dihydroxy-2,2-dinaphthyl urea.

NEW STANDARD FOR CHICK-MARTIN DISINFECTANT TEST

THE British Standards Institution has just issued a new British standard for the Modified Technique of the Chick-Martin Test for Disinfectants (B.S.S. 808). The Chick-Martin Test, which was devised at the Lister Institute and first described in 1908, provided for the inclusion of organic matter during the carrying out of the test, which would make its conditions more comparable with the conditions of use in many cases.

The organic matter used was dried faeces, but this has certain objections and was variable in character, and as a result of the suggestion first put forward by Professor L. P. Garrod, dried faeces was replaced by yeast. Further modifications in the technique of the test were recommended, with the result that the test now gives more consistent results than hitherto, while the co-efficients obtained are substantially the same as those previously obtained with the original method. Full details are given as to reagents and the method for carrying the test. Copies may be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d., post free.

References to Current Literature

Inorganic

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Rock formation. Morey, *Chem. and Ind., 57*, 966-971.

Organic

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Sulphur determinations from bomb-washing titrations. Kaufman, *Ind. Eng. Chem. analyt. ed., 10*, 538-540.

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Mineral Oils, Gas, Tar

Refrigeration in natural gasoline plants. Albright, *Refiner, 17*, 431-433.

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Manufacture of petrol by the catalytic reduction of carbon monoxide by hydrogen. Berthelot, *Chim. et Ind., 40*, 434-460.

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Comparative tests of cellulose triacetate foils. Werner, *Angew Chem., 51*, 681-684.

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Metals, Electrometallurgy

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*p*H and electrode reactions. Lyons, *Amer. Electro-Platers' Soc. Monthly Rev.*, 1938, 661-670.

Fats, Oils, Waxes

Modification of the soft resin in shellac. Venagopalan and Sen, *Paint Techn., 3*, 297-304.

Acid and iodine numbers and their determination. *Paint Manuf., 8*, 283-284.

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Detection of tallow in bacon fat. Bömer and Hagemann, *Fette u. Seifen, 45*, 479-487.

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Application of paint to sheet steel. Stuart, *Chem. and Ind., 57*, 961-963.

Zinc in pigment manufacture. Ruprecht, *Farben Chem., 9*, 300-310.

Action of solvents and impregnating lacquers on enamelled wires. Greulich, *Z. Elektrochem., 44*, 627-636.

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Polymerisation and its application to paint chemistry. Stark, *National Paint Bull., 2*, No. 9, 12-14.

Flat wall paint formulations. Troutman, *Fed. Paint Varnish Prod. Clubs Digest*, 1938, No. 178, 368-379.

Rubber, Plastics

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Manufacture of phenolic resins using sulphur chloride. Berthel, *Rev. Générale Matières Colorantes, 14*, 214-216.

Polystyrol resins of various chain length. Jencekel and Ueberreiter, *Z. Phys. Chem., A, 182*, 361-383.

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Wood preserving agents. Hadert, *Farben Chem., 9*, 296-300.

Adsorption of colloidal graphite from oil sols by metal surfaces. Pavelka and Wischin, *Kolloid Z., 84*, 334-339.

Recent physical technique in chemistry and metallurgy. Boutaric, *L'Ind. Chim., 25*, 579-584.

Water-in-oil emulsions. Pink, *J.C.S.*, 1938, 1,252-1,254.

From Week to Week

COLVILLES, LTD., steel and iron manufacturers, have given £10,000 to the Royal Infirmary, Glasgow, to commemorate the Royal visit to their Clydebridge Works, Cambuslang, last May.

OF 151,370 articles examined during 1937, under the Food and Drugs (Adulteration) Act, 8,401 were found to be adulterated or not up to standard, according to a Blue Book issued by the Ministry of Health.

THE SEARCH FOR OIL IN SCOTLAND has been extended to Fife during the past week, and preliminary steps towards sinking a bore of the type used at Dalkeith have been taken by the D'Arcy Exploration Co., Ltd., working in conjunction with the B.P. Petroleum Co.

UNITED STATES exports in September were £10,000,000 less than in September last year, and imports showed a fall of £13,500,000. For the nine months ended September 30, exports amounted to £475,000,000, against £490,000,000, and imports £295,000,000, against £500,000,000.

THE SOUTH WALES ALUMINIUM CO. has been formed under the auspices of Aluminium Industrie (a Swiss undertaking), the British Aluminium Co., and the Aluminium Co. of Canada, to erect an aluminium factory in Glamorganshire. The new company is purely a private concern and none of its capital of £500,000 is to be issued to the public.

DR. BENTZ, director of the Institute for Petroleum Research of the Prussian Geological Academy, announced in Hanover recently that the amount of petroleum obtained from German national sources had risen from 230,000 tons in 1933 to about 550,000 tons in 1938. The potential supply of oil is, according to Dr. Bentz, however, much greater than this latter figure.

THOMAS HILL-JONES, LTD., have purchased the old-established coal-dust grinding and foundry facings business from Mr. Samuel Oliver, of Trafalgar Square, Walworth. The business, which has been established for over 100 years and contains on its books accounts with all the old firms of engineers, such as John Penn and Maudesley, Son, and Field, has been transferred to Thomas Hill-Jones' factory, Invicta Works, Bow Common Lane, London, E.3, where orders and inquiries should in future be sent.

THE LOSS OF 2,458 GALLONS OF TURPENTINE was partially solved at Thames Police Court last week, when two men were sentenced to imprisonment for stealing four drums of turpentine, each containing three-and-a-half cwt. of turpentine, from the Concordia Works, Managers Street, Poplar, the turpentine being the property of the White Sea and Baltic Co., Ltd. It was stated that the firm had lost 2,458 gallons of turpentine, valued at £369 in the last nine months, and it had been a mystery how it had been removed from the premises.

SPEAKING AT THE ANNUAL DINNER OF THE NATIONAL LUBRICATING OIL AND GREASE FEDERATION on October 19, Mr. V. E. Eberle said it was felt that the time was overdue when a National Trade Association for the lubricating oil industry should be formed, and it was also believed that the Association should take the form of an association with three sections, the first being the importers, the second, the larger distributors, and the third section consisting of the present members of the Federation and, it was hoped, many who were outside at present and unassociated with it. It was felt that each of these sections should be autonomous, but maintaining close contact.

IMPERIAL AIRWAYS' technical experts have been studying the problem of ice formation on the wings of aircraft, and claim to have perfected a method of preventing it becoming dangerous. An improved paste, known as Kilfrost, has been devised which is described as eating up the ice as soon as it forms. The ice, instead of adhering to the surface of the wing, is blown away by the wind created by the passage of the aircraft through the air. The paste has now been officially approved as a medium for de-icing aircraft in flight by the Ministry's Civil Airworthiness Committee. Mechanical methods of removing ice from wings and leading edges of aircraft were considered less satisfactory for use on the company's regular services and were, therefore, discarded in favour of the chemical compound.

THE 1938 RAT WEEK begins on November 7, and is organised by the Ministry of Agriculture in an effort to exterminate as many as possible of Great Britain's 40,000,000 rats. A modest estimate of the total cost of rats in Great Britain is £70,000,000 a year. Since trapping and poisoning are dangerous and inconvenient and gassing is an expensive means of destroying rats in most situations, extermination by virus is now considered the most satisfactory method in modern trade and industry. It is particularly valuable because it ensures that before dying the rats are driven off the premises into the open in search of water, and the possible danger of decaying bodies remaining in shops and warehouses is thus eliminated. The makers of Liverpool Virus have inaugurated a special service for traders offering free recommendation and advice, after survey by an expert if necessary, and readers are invited to make fullest use of the service.

AN ILLUSTRATED BOOKLET HAS BEEN PUBLISHED BY FESCOL, LTD., featuring the opening of their new works at North Road, London, N.7. (See THE CHEMICAL AGE, October 22, p. 321). The booklet gives details of the plant and its capacity.

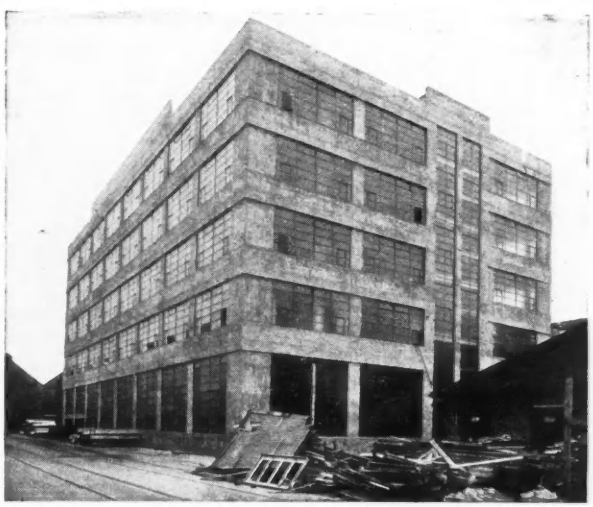
AUGUST IMPORTS of alumina into Canada, including bauxite ore, amounted to 716,858 pounds valued at $191,926 compared with 1,304,794 at $323,270 in July and 509,356 valued at $447,558 in August, 1937. British Guiana supplied 660,694 pounds and the United States 56,164 pounds.

THE IMPORT DUTIES ADVISORY COMMITTEE give notice of an application for the addition to the Free List of alloys containing from 90 to 95 per cent. of silicon. Any representations which interested parties may desire to make in regard to this application should be addressed in writing to the Secretary, Import Duties Advisory Committee, Shell-Mex House, Strand, London, W.C.2, not later than November 17.

THE TREASURY have made an Order under Section 10 (5) of the Finance Act, 1926, exempting lithium fluoride crystals, not optically worked, weighing not less than 2.5 grammes each from Key Industry Duty from November, 1938, until December 31, 1939. The Treasury Order, which will be entitled The Safeguarding of Industries (Exemption) No. 4 Order, 1938, will shortly be published by H.M. Stationery Office.

THE VARIED APPLICATIONS OF ELECTRO-DEPOSITION were on view at a special exhibition held at the Science Museum, London, in 1935, and the success of this exhibition has prompted the arrangement of a smaller permanent exhibit, which has been generously presented by the Electrodepositors' Technical Society. With some ingenuity the main features of the original exhibition, which occupied a floor space of 4,000 sq. ft., have been incorporated in a single case. This is now on view in the Chemistry Collections of the Science Museum.

UP TO THE END OF SEPTEMBER, 1938, offers of contributions towards rent, rates and income tax had been made to 66 industrial undertakings to induce them to set up factories in the special areas of England and Wales, and further negotiations were in progress. On the Team Valley Trading Estate near Gateshead, 84 factories had been completed up to the end of September; 71 were occupied and 67 in actual production and employing 1,504 people. Tenants had been obtained for 47 further factories of which 20 were under construction. On the South Wales Trading Estate at Treforest, 27 factories had been completed at the end of September, of which 26 were occupied, giving employment to 682 people. A further 20 factories were under construction for tenants. The Commissioner's total commitments at the end of September, 1938, in respect of all the Special Areas in England and Wales were approximately £16,770,000.



For the fourth time during the last ten years, G. A. Harvey & Co. (London) Ltd., have found it necessary to make a considerable addition to their works at Woolwich Rd., Charlton, S.E.7. and the latest extension (shown above) brings the total area covered by their works up to 25 acres. The new building, which is nearing completion, was designed by Mr. Kenneth M. Roberts, M.Inst.R.A., and is a reinforced concrete structure of five storeys with a total floor area of about 70,000 sq. ft. A railway siding connects the new building with the Southern Railway system and with a wharf on the River Thames.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

PURIFICATION OF COAL GAS, ETC., from sulphur compounds.—E. B. Maxted. 28323.

PURIFICATION OF CRUDE COAL GAS, ETC., from sulphur compounds.—E. B. Maxted. 28725.

PREPARATION OF ALLOYS OF ALUMINIUM, ETC.—Metallurgica Bresciana già Tempini. (Italy, Oct. 5, '37.) 28896.

HYDROXYALKYLAMINO COMPOUNDS, ETC.—F. Meyer. (United States, Nov. 20, '37.) 28526; (United States, July 28.) 28527.

TREATMENT OF WASTE SULPHITE LIQUOR.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. (Norway, Aug. 23.) 28713.

MANUFACTURE OF FERROPRUSSIATE PAPERS.—Norton and Gregory, Ltd., and H. D. Murray. 28811.

ELECTROLYTIC OXIDATION OF ALUMINIUM, ETC.—H. Papst. (Germany, Oct. 4, '37.) 28824; (Germany, July 4.) 28825.

PREPARATION OF WETTING FROTHING-AGENTS.—F. Pollak. 28607.

MANUFACTURE OF IRON OXIDE.—Priestman Collieries, Ltd., and T. G. French. 28499.

MANUFACTURE OF HYDROXY-KETONES of the cyclopentano-polyhydrophenanthrene series.—Schering, A.-G. (Germany, Oct. 5, '37.) 28929; (Germany, April 14.) 28930; (Germany, June 2.) 28931; (Germany, June 28.) 28932.

MANUFACTURE OF UNSATURATED COMPOUNDS of the cyclopentano-polyhydrophenanthrene series.—Schering, A.-G. (Germany, Oct. 5, '37.) 28933.

MANUFACTURE OF DINITRILES OF DICARBONYLIC ACIDS.—Soc. of Chemical Industry in Basle. (Switzerland, Oct. 16, '37.) 28897; (Switzerland, Aug. 24.) 28898.

CATALYTIC PROCESS FOR VAPOUR PHASE REACTIONS.—Standard Oil Development Co. (United States, Nov. 13, '37.) 28379.

RESINOUS CONDENSATION PRODUCTS, ETC.—H. J. Tattersall, and Imperial Chemical Industries, Ltd. 28544.

PRODUCTION OF β-ARALKYLAMINES.—T. H. Temmler. (Germany, Oct. 2, '37.) 28581.

PRODUCTION OF AMINES FROM ESTERS of amino-alcohols.—T. H. Temmler. (Germany, Oct. 30, '37.) 28656.

PRODUCTION OF AMINES.—T. H. Temmler. (Germany, March 30.) 28657; (Germany, May 4.) 28658; (Germany, June 1.) 28659.

PRODUCTION OF N-METHYLPHENYLETHYLAMINES.—T. H. Temmler. (Germany, May 24.) 28660.

PRODUCTION OF OPTICALLY ACTIVE PHENYLISO-PROPYLAMINES.—T. H. Temmler. (Germany, June 1.) 28661.

PRODUCTION OF STEEL.—A. Thyssen-Hütte, A.-G. (Germany, Dec. 13, '37.) 28530.

MANUFACTURE OF ALIPHATIC ETHERS.—Usines de Melle. (France, Oct. 27, '37.) 28803.

PROCESS FOR THE RECOVERY OF OXYGEN from gaseous mixtures. K. C. Warne, J. W. Woolcock, and Imperial Chemical Industries, Ltd. 28365.

MANUFACTURE OF BLASTING EXPLOSIVES.—V. H. Williams, and Imperial Chemical Industries, Ltd. 28543.

FIREPROOFING OF MATERIALS consisting partially of rubber.—T. Wituski. (Germany, June 15.) 28701.

PRODUCTION OF STABLE ORGANIC CALCIUM SALT SOLUTIONS suitable for injection.—G. A. R. von Wulfing, and E. M. Herrmann. (Germany, April 27.) 28501.

DETERGENTS.—Aktiebolaget Purnol. (Sweden, Oct. 9, '37.) 29340.

PURIFICATION OF OILS.—J. Bibby and Sons, Ltd., Sturtevant Engineering Co., Ltd., A. Ibison, and H. W. Wagner. 29424.

PROCESS FOR POLYMERISING VINYL ESTERS.—Carbide and Carbon Chemicals Corporation. (United States, Oct. 29, '37.) 29073.

REMOVAL OF HYDROGEN SULPHIDE FROM GASES.—Courtaulds, Ltd., A. D. Heywood, R. S. Thomas, and E. H. Sharples. 29553.

MANUFACTURE OF CARBONYLIC ACID ANHYDRIDES.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. (Belgium, Oct. 9, '37.) 29344.

PRODUCTION OF ARTIFICIAL RESINOUS PRODUCTS and pentaerythrol.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. (Germany, Oct. 11, '37.) 29345. (Germany, Feb. 25.) 29346; (Germany, Aug. 2.) 29347.

PLASTICISING OF RUBBER.—E. I. du Pont de Nemours and Co. (United States, Oct. 8, '37.) 29323.

PRODUCTION OF CELLULOSE ETHERS.—E. I. du Pont de Nemours and Co. 29161.

HARD-METAL ALLOYS.—F. Eisner. (Switzerland, April 29.) 29402.

NICKEL-CHROMIUM ALLOYS.—Electro Metallurgical Co. (United States, June 15.) 29074.

ZINC ALLOYS.—G. von. Giesche's Erben. (Germany, Oct. 23, '37.) 29138.

METHOD, ETC., OF PARTIALLY OXIDISING GASEOUS, ETC., HYDROCARBONS.—Gutehoffnungshütte Oberhausen, A.-G. (Germany, Oct. 11, '37.) 29408.

PRODUCTION OF FAST DYEINGS on vulcanised fibre.—W. W. Groves (I. G. Farbenindustrie.) 29539.

COPPER-ALUMINIUM ALLOY.—H. C. Hall, and H. E. Gresham. 29085.

MANUFACTURE OF IODO DERIVATIVES OF STEROID COMPOUNDS.—B. Helferich. (Germany, Oct. 12, '37.) 29604.

MANUFACTURE, ETC., OF OXIDATION PRODUCTS of high molecular aliphatic hydrocarbons.—I. G. Farbenindustrie. (Germany, Oct. 7, '37.) 28989.

PROCESS, ETC., FOR THE CONTINUOUS MANUFACTURE OF HEAVY METAL AZIDES, ETC.—J. Meissner. (Germany, July 14.) 29155.

CONTINUOUSLY SPLITTING SAPONIFIABLE OILS, ETC.—Metallges, A.-G. (Germany, Oct. 18, '37.) 29609; (Germany, Sept. 24.) 29610.

MANUFACTURE OF DERIVATIVES OF PHENANTHRIDINE.—Sir. G. T. Morgan, and L. P. Walls. 29037.

MANUFACTURE OF AMINES.—R. Robinson, A. Lowe, and Imperial Chemical Industries, Ltd. 28993.

TREATMENT OF OLEFINIC HYDROCARBONS.—R. F. Ruthruff. 29443.

MANUFACTURE OF COMPOUNDS of cyclopentano-polyhydrophenanthrene series.—Schering, A.-G. (Germany, Oct. 12, '37.) 29602; (Germany, May 13.) 29603.

PRODUCTION OF HIGHLY CONCENTRATED HYDROGEN PEROXIDE SOLUTION.—H. Schmidt. (Germany, Oct. 12, '37.) 29600.

CATALYTIC TREATMENT OF HYDROCARBONS.—Standard Oil Development Co. (United States, Nov. 19, '37.) 29269.

MANUFACTURE OF CARBON DIOXIDE.—T. W. Starkey. 29014.

MANUFACTURE OF ALKALI CELLULOSE.—W. J. Tennant (Dow Chemical Co.). 28998.

PROCESS FOR EFFECTING THE ALKALINE DEGRADATION OF BAUXITE. Vereinigte Aluminium-Werke, A.-G. (Germany, Oct. 13, '37.) 29398.

CONCENTRATING THE BITUMEN CONTENT OF OIL SHALES by flotation.—Visura Treband-Ges. (Switzerland, Oct. 9, '37.) 29081; (Switzerland, March 18.) 29082.

MANUFACTURE OF HYDROGEN PEROXIDE.—G. Adolph and M. E. Bretschger. (United States, Nov. 17, '37.) 30024.

RUBBER ANTIOXIDANTS.—W. Baird, R. F. Goldstein, M. Jones, and Imperial Chemical Industries, Ltd. 30178.

METHOD OF HYDROGENATING KETONES, ETC.—J. Blumenfeld. (France, Oct. 14, '37.) 29861.

HYDROGENATION OF KETONES, ETC.—J. Blumenfeld. 29862.

OXIDATION OF UNSATURATED CYCLIC KETONES.—C. F. Boehringer and Soehne Ges. (Germany, Oct. 15, '37.) 29825.

RESINOUS COMPOSITIONS.—British Thomson-Houston Co., Ltd. (United States, Oct. 16, '37.) 29830.

WORKING UP OF CELLULOSE DERIVATIVES.—Deutsche Hydrierwerke, A.-G. (Germany, Oct. 13, '37.) 29713; (Germany, Oct. 7.) 29714.

Complete Specifications Open to Public Inspection

PROCESS FOR THE MANUFACTURE OF ANHYDROUS BERYLLIUM FLUORIDE free from oxide.—Seri Holding Soc. Anon. April 17, 1937. 29349/37.

MANUFACTURE OF ARTIFICIAL PLASTIC MASSES and textile fibres. British Glycerine Manufacturers, Ltd. April 17, 1937. 4062/38.

CATALYTIC OXIDATION OF UNSATURATED ORGANIC COMPOUNDS.—Research Corporation. April 13, 1937. 7099/38.

PREPARATION OF OPTICALLY ACTIVE β-(p-OXYPHENYL) ISOPROPYLMETHYLAMINES.—Knoll, A.-G. Chemische Fabriken. April 17, 1937. 8947/38.

RUBBER COMPOSITIONS.—Standard Telephones and Cables, Ltd. April 14, 1937. 9206/38.

MANUFACTURE OF COLOURED SHAPED STRUCTURES from cellulose esters or ethers.—Soc. of Chemical Industry in Basle. April 14, 1937. 10248/38.

PRODUCING HYDROCARBONS by the catalytic conversion of carbon monoxide with hydrogen.—Ruhrchemie, A.-G. April 17, 1937. 10468/38.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. 10674/38.

PRODUCTION OF ALUMINIUM OXIDE.—E. Klein, and R. Steiner. April 14, 1937. 11105/38.

HARDENING OF POLYMERISATES.—Siemens and Halske, A.-G. April 15, 1937. 11397/38.

MANUFACTURE OF COPPER COMPLEX COMPOUNDS of polyazo- dyestuffs of the stilbene series.—I. G. Farbenindustrie. April 16, 1937. 11569/38.

DEGREASING METAL or metal parts.—Bennett (Hyde), Ltd. April 16, 1937. 11628/38.

PROCESS FOR THE MANUFACTURE OF A CHLORIDE OF CARBON.—Consortium Fur Elektrochemische Industrie Ges. April 17, 1937. 11668/38.

MAKING SULPHUR DIOXIDE.—A. N. Mann. April 15, 1937. 11690/38.

METHOD OF TREATING CELLULOSE ETHERS.—Kalle and Co., A.-G. April 17, 1937. 11720/38.

PRODUCTION OF CELLULOSE DERIVATIVES.—E. I. du Pont de Nemours and Co. April 15, 1937. 11746/38.

MANUFACTURE OF LUBRICATING-OILS.—E. I. du Pont de Nemours and Co. April 17, 1937. 11747/38.

Specifications Accepted with Date of Application

PRINTING AND DYEING with the ester salts of leuco vat dyestuffs.—Durand and Huguenin, A.-G. Oct. 26, 1936. 492,931.

TREATMENT OF RUBBER.—T. A. Clayton. April 14, 1938. 492,803.

POLYHYDRIC ALCOHOL-POLYBASIC ACID CONDENSATION PRODUCTS. D. G. Anderson and R. L. Yeates. Nov. 5, 1937. 492,934.

PROCESS FOR THE MANUFACTURE OF THIOACETAL-SULPHONIC ACIDS. J. R. Geigy, A.-G. Nov. 25, 1936. (Samples furnished.) 492,938.

PRODUCTION OF HYDROGEN PEROXIDE.—G. Adolph, and M. E. Bretschger. May 14, 1937. 493,034.

PROCESS FOR THE MANUFACTURE OF VALUABLE CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) April 1, 1937. (Samples furnished.) 493,442.

MANUFACTURE OF SUBSTITUTES FOR WOOL FROM VISCOSE.—W. W. Groves (I. G. Farbenindustrie.) April 2, 1937. 493,288.

PRODUCTION OF OIL-SOLUBLE CONDENSATION PRODUCTS from phenols and aldehydes.—Bakelite, Ltd. (Bakelite Ges.). April 2, 1937. 493,290.

MANUFACTURE OF CHROMABLE DYESTUFFS of the triaryl-methane series.—W. W. Groves (I. G. Farbenindustrie.) April 5, 1937. (Addition to 472,757.) 493,293.

MANUFACTURE OF AROMATIC NITRO-COMPOUNDS.—I. G. Farbenindustrie. April 4, 1936. 493,294.

TREATMENT OF CADMIUM and cadmium-coated surfaces.—H. R. Priston and S. G. Clarke. April 5, 1937. 493,299.

COATING OF SURFACES OF ZINC or zinc alloys.—American Chemical Paint Co. Nov. 30, 1936. 493,365.

RECOVERY OR PRODUCTION OF UNITARY CYCLIC COMPOUNDS from the products obtained in the pressure extraction of solid carbonaceous materials.—G. W. Johnson (I. G. Farbenindustrie.) April 6, 1937. 493,447.

PRODUCTION OF DERIVATIVES OF STARCH.—A. A. Houghton, and Imperial Chemical Industries, Ltd. April 6, 1937. 493,513.

MANUFACTURE AND PRODUCTION OF DYESTUFFS of the naphthalene series.—G. W. Johnson (I. G. Farbenindustrie.) April 6, 1937. 493,147

APPARATUS FOR THE MANUFACTURE AND PRODUCTION OF CONCENTRATED HIGHLY OXIDISED OXIDES OF NITROGEN.—G. W. Johnson (I. G. Farbenindustrie.) April 7, 1937. 493,450.

RECOVERY OR PRODUCTION OF UNITARY CYCLIC COMPOUNDS from the products obtained by the pressure extraction or destructive hydrogenation of carbonaceous materials.—G. W. Johnson (I. G. Farbenindustrie.) April 7, 1937. 493,307.

PRODUCTION OF PIGMENTS for protection against rust and preservation of wood.—H. Fairbrother (Subox, A.-G. Elektro-Chemische Fabrik). April 9, 1937. 493,469.

MANUFACTURE OF DYES.—Kodak, Ltd. (Eastman Kodak Co.). April 8, 1937. 493,455.

MANUFACTURE OF DERIVATIVES OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. April 9, 1936. 493,463.

MANUFACTURE OF AZO-DYESTUFFS soluble in water.—W. W. Groves (I. G. Farbenindustrie.) April 9, 1937. 493,464.

MANUFACTURE OF VERMICIDAL COMPOUNDS.—W. W. Groves (I. G. Farbenindustrie.) April 9, 1937. 493,465.

IMPROVING FUEL OILS by treatment with hydrogenating gases. H. E. Potts (International Hydrogenation Patents Co., Ltd.). April 10, 1937. 493,470.

MANUFACTURE AND PRODUCTION OF DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) April 15, 1937. 493,154.

ALLOY STEELS.—W. H. Hatfield and J. F. Bridge. April 19, 1937. 493,311.

MANUFACTURE AND PRODUCTION OF AZOMETHINE DYESTUFFS containing metal.—I. G. Farbenindustrie, and G. W. Johnson. April 21, 1937. 493,314.

MANUFACTURE OF VAT-DYESTUFFS of the phthaloylcarbazole series containing trifluoromethyl groups and of their leuco sulphuric esters.—A. Carpmael, and W. W. Groves (I. G. Farbenindustrie.) April 21, 1937. 493,211.

MANUFACTURE OF AROMATIC AMINO-COMPOUNDS.—I. G. Farbenindustrie. April 4, 1936. 493,339.

CELLULOSE DERIVATIVE COMPOSITIONS.—Celluloid Corporation. Nov. 19, 1936. 493,236.

MANUFACTURE OF ACID WOOL DYESTUFFS.—I. G. Farbenindustrie. Dec. 12, 1936. (Samples furnished.) 493,406.

SEPARATING ETHER OUT OF MIXTURES OF ETHER AND AQUEOUS ALCOHOL.—Buss, A.-G. Jan. 29, 1937. 493,420.

PRODUCTION OF GAS MIXTURES rich in hydrogen.—Ges. Fur Linde's Eismaschinen, A.-G. March 20, 1937. 483,259.

MANUFACTURE AND PRODUCTION OF DYESTUFFS.—I. G. Farbenindustrie, and G. W. Johnson. April 21, 1937. 493,501.

MANUFACTURE OF ESTERS OF UNSATURATED ALCOHOLS.—Dr. A. Wacker Ges. Fur Elektro-Chemische Industrie Ges. May 3, 1937. 493,196.

RECOVERY OR PRODUCTION OF UNITARY CYCLIC COMPOUNDS from the products obtained in the pressure extraction of solid carbonaceous materials.—G. W. Johnson (I. G. Farbenindustrie.) April 6, 1937. 493,508.

MANUFACTURE OF LOW-PHOSPHOROUS BASIC BESSEMER STEEL.—Stewarts and Lloyds, Ltd., and H. A. Dickie. Jan. 8, 1937. 493,610.

COMPOSITION FOR THE DEGREASING AND CONDITIONING OF SURFACES, and process of manufacture thereof.—Bennett (Hyde), Ltd. Jan. 11, 1936. 493,611.

REFINEMENT OF STEEL.—H. A. Brassert, and H. A. Brassert and Co., Ltd. Jan. 13, 1937. 493,731.

PREPARATION OF CELLULOSE XANTHATE SOLUTIONS.—L. Mellersh-Jackson (Brown Co.). March 9, 1937. 493,696.

METHOD OF RENDERING CAST-IRON IMMUNE FROM ATTACK BY SEA-WATER.—R. A. Blakeborough, F. A. Klouman, and W. R. Garratt. March 11, 1937. 493,838.

Chemical and Allied Stocks and Shares

A NEW Stock Exchange account commenced on Monday and the stock and share markets have shown rather more active conditions. Interest tended to centre on shares of companies with important armament and kindred activities, but in numerous other directions movements in prices have been in favour of holders, and shares of companies associated with the chemical and allied trades showed various features of interest.

Imperial Chemical were in demand, and in sympathy with the general market trend, show a rise from 30s. 1½d. to 31s. 10½d. on balance for the week. Turner and Newall have been a firmer market around 77s. 6d., aided by the hope that the dividend may be kept on a 20 per cent. basis. Imperial Smelting shares were better owing to the belief that the outlook for the company will be much improved if the application for an increase in the zinc duty proves successful. The ordinary shares of the latter company have moved up to 13s. at the time of writing, and the 6½ per cent. preference shares, whose dividend for the past year was only 4½ per cent., have been in request around 18s. 9d. B. Laporte were unchanged at 85s., following the announcement that the interim dividend is to be maintained. Borax Consolidated deferred units have been more active, but were subject to moderate fluctuations, and are 25s. 9d. at the time of writing.

Iron and steel securities have made much better prices, partly owing to the belief that the heavy industries generally are likely to be more actively employed as a result of the speeding up of armament work. An additional factor influencing sentiment was the more hopeful views as to dividend prospects. Dorman Long at 29s. show a large rise on the hope that the forthcoming dividend may be rather higher than the 10 per cent. paid for the previous year, while Colvilles have improved to 24s. 3d., pending the interim dividend announcement. United Steel responded to the market tendency with a rise to 26s. 1½d., while Consett Iron were also higher, as were Stewarts and Lloyds, Staveley and Stanton Ironworks ordinary shares. Tube Investments were better at 83s. 3d., awaiting the full results.

Following news that the company's offer in respect of the ordinary shares of Eno Proprietaries has been successful, Beechams Pills deferred were firmer around 8s. 1½d. Boots Pure Drug were higher at 40s. 6d., while Sangers were steady at 21s. 10½d., the latter being assisted by the view that the interim dividend will probably again be 10 per cent. Timothy Whites and Taylors at 24s. 3d. were virtually the same as a week ago, and British Drug Houses were again around 21s. Triplex Glass were higher at 31s. 9d., and a better price was made by Dunlop Rubber, which are 24s. 9d. at the time of writing. The market is prepared for a reduction in the dividend of the latter company in view of the reference to lower profits made in the interim statement, but the disposition is to assume that the shares are moderately valued, although dividend estimates vary a good deal. Fison Packard and Prentice rose to 38s. following publication of the results.

Lever and Unilever were higher at 36s. 3d. in sympathy with the better market tendency, and also because of expectations that the interim dividend will at least be maintained. International Nickel were active as usual, although not more than the maintenance of the quarterly dividend at 50 cents per share is being anticipated. Swedish Match have risen to 28s. 9d. in response to the belief that the stage is being reached when the shares are likely to return to the dividend list. Demand was in evidence for Enfield Rolling Mills shares on anticipations that improved results may be shown for the past year's working.

Leading oil shares have been more active and "Shell," Anglo-Iranian and Burmah Oil recovered part of their recent sharp reaction. Trinidad Leaseholds were steadier.

Weekly Prices of British Chemical Products

TRADE in the general chemical market during the past week has been mainly of a routine character, and the volume of inquiry about the average for the period. A firmer tendency has been noticeable in some directions, and with very few exceptions the general tone of the market is satisfactory. Buyers are reported to be taking up, with regularity, their commitments under existing contracts, but only a little interest has been displayed in fresh contract business. There are no outstanding price alterations to record and quotations generally continue at recent levels. The market in coal tar products is quiet and movements during the past week have been on a very limited scale. Quotations for creosote are weaker, but in other directions the price position remains unchanged.

MANCHESTER.—Although the undertone during the past week has been somewhat brighter, the demand for chemicals on the Manchester market has shown little actual expansion so far as new bookings are concerned, buyers being content for the most part to limit dealings to small lots for near delivery. In the case of textile chemicals, deliveries against contracts have continued to show a slight improvement, whilst the flow of specifications from other directions has been fairly satisfactory. Prices generally remain on a steady basis. A little more inquiry has been about in some sections of the tar products market, but the demand is still comparatively quiet, with little movement of values to report.

Price Changes

Rises: Chromium Oxide, green; Barium Chloride (Glasgow).
Falls: Copper Sulphate (Manchester); Creosote, home trade and export; Dinitrobenzene; Dinitrotoluene, 48/50° C.; Nitronaphthalene; *o*-Toluidine; *p*-Toluidine; *m*-Xylidine Acetate.

GLASGOW.—Business in general chemicals has been rather quieter during the week, both for home trade and export. Prices, however, remain very steady at about previous figures, with no important changes to report.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey, £18 10s. per ton, d/d U.K. Fine white, 98%, £17 per ton, d/d U.K.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £12 per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4¼d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 2⅞d. per lb.; liquor, £13 per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11½d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0¼d. per lb. MANCHESTER: 1s. 0¼d. SCOTLAND: B.P. crystals, 1s. 0¼d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£18 5s. per ton, less 2% in casks. MANCHESTER: £19 per ton f.o.b. SCOTLAND: £19 per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £3 17s. 6d. to £4 17s. 6d. per cwt. according to quantity; in drums, £3 10s. 0d. to £4 2s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 9d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £30; brown, £1 per ton less. MANCHESTER: White, £31; brown, £30.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£31 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £31 per ton, less 2¼% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £31 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—Calcined, in bags, ex works, about £8 per ton. SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—Solid (ex wharf) £5 10s. per ton. SCOTLAND: £7 5s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. pe. lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 6s. 3d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¼d. to 10½d. per lb. SCOTLAND: B.P. Crystals, 10½d. MANCHESTER: B.P. 9¼d. to 11½d.

POTASSIUM PRUSSIATE.—6¼d. per lb. SCOTLAND: 6¾d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d. to 6¾d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6¾d. per lb. net, ex store

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 11s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 15s.

SODIUM BISULPHITE POWDER.—60/62%, £14 10s. per ton d/d in 2-ton lots for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts.

SODIUM CHROMATE.—4½d. per lb. d/d U.K.
4d. per lb. GLASGOW: 4½d. net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £16 10s. per ton delivered per ton lots.

SODIUM PRUSSIATE.—5d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4¼d. to 5¼d.

SODIUM SILICATE.—£8 2s. 6d. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1¼d. per lb. GLASGOW: 1s. 1¼d. per lb., 5%, ex store.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CARBON BLACK.—3⅜d. to 4 1/16d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11½d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4¾d. to 5½d. per lb.; dark 3¾d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1939; November, £7 8s.; December, £7 9s. 6d.; January, 1939; £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1939; November, £7 12s. 6d.; December, £7 13s. 9d.; January, 1939, £7 15s.; February, £7 16s. 3d.; March, £7 17s. 6d.; April/June, £7 18s. 9d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1939.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1939.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3½d. to 1s. 4d., 90%, 1s. 4½d. to 1s. 5d., pure, 1s. 8½d. to 1s. 9d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. MANCHESTER: Pure, 1s. 8d. per gal.; crude, 1s. per gal.

CARBOLIC ACID.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 1s. 9d. to 2s. 0d.; dehydrated, 2s. 6d. per gal., according to specification; Pale, 99/100%, per lb. f.o.b. in drums; crude, 2s. 1d. per gal.

CREOSOTE.—Home trade, 4½d. per gal., f.o.r. makers' works; exports 6¼d. to 6½d. per gal., according to grade. MANCHESTER: 4d. to 4¾d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5¾d. to 6¼d.

CRESYLIC ACID.—97/99%, 1s. 9d. to 2s.; 99/100%, 2s. 6d. to 3s. 6d. per gal., according to specification; Pale, 99/100%. 2s. 1d. to 2s. 3d.; Dark, 95%, 1s. 7d. to 1s. 8d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 1s. 11d.

NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £5 to £6 per ton; purified crystals, £11 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £12 10s. to £13 10s. per ton f.o.b.

PITCH.—Medium, soft, 33s. per ton, f.o.b. MANCHESTER: 31s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 11s. 6d. to 13s. 6d. per gal.; 90/160%, 9s. 6d. to 10s. 9d. per gal.; 90/180%, 2s. 6d. to 3s. 6d. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 9s. 6d. to 12s. per gallon.

TOLUOL.—90%, 1s. 10d. per gal.; pure 2s. 2d. GLASGOW: 90% 120, 1s. 10d. to 2s. 1d. per gal MANCHESTER: Pure 2s. 4d. per gallon, naked.

XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £6 15s. to £9 5s. per ton; grey, £8 5s. to £8 10s. MANCHESTER: Brown, £8s. 10d.; grey, £9 15s.

METHYL ACETONE.—40.50%, £32 to £35 per ton.

WOOD CREOSOTE.—Unrefined, 6d. to 8d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—2s. 8d. to 3s. per gal.; solvent, 3s. 3d. to 3s. 6d. per gal.

WOOD TAR.—£3 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—7½d. per lb.

DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL —£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. 1d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—9½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—10½d. per lb., in 8/10 cwt. drums, drums extra.

p-TOLUIDINE.—1s. 10½d. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH SMOKELESS AND OIL FUELS, LTD., London, E.C. (M., 29/10/38.) October 18, £500 debenture to Baron Cornwallis, Horsmonden; general charge. * £2,007. January 14, 1938.

DIGBY AND CO. (MANUFACTURING CHEMISTS), LTD., London, N. (M., 29/10/38.) October 17, debentures, to A. A. Goldapple, Stepney, securing £600 and any further advances; general charge.

Satisfactions

BRITISH CELANESE, LTD., London, W. (M.S., 29/10/38.) Satisfaction October 19, of debenture stock registered June 21, 1934, to extent of £6,399.

GENERAL STEEL AND IRON CO., LTD., London, E.C. (M.S., 29/10/38.) Satisfaction, October 19, of second debenture registered June 24, 1938.

MARSHALL PAINTS, LTD., Blackpool. (M.S., 29/10/38.) Satisfaction October 14, £1,000, registered December 11, 1936.

Companies Winding-up Voluntarily

BRITISH HYDROGENATION, LTD. (C.W.U.V., 29/10/38.) October 7 (members). H. W. Hembry, 28 Grosvenor Place, S.W., appointed liquidator.

Company News

B. Laporte, Ltd., have declared an interim ordinary dividend of 5 per cent., less tax (same).

Greeff-Chemicals Holdings have announced an ordinary interim dividend of 3 per cent. on account of 1938 (against 4 per cent.).

National Fertilisers, Ltd., have announced a dividend of 2 per cent., on the ordinary shares in respect of the year ended June 30 last.

British Alkaloids have announced an interim dividend of 8 per cent. on 8 per cent. participating preference shares and of 12 per cent. on ordinary shares (both the same).

Midland Tar Distillers have announced a final dividend of 2½ per cent., free of tax, on the ordinary shares, making 5 per cent., free of tax, for the year to June 30 (unchanged).

D.D.D. Company, Ltd., manufacturers of medicinal preparations, has increased its nominal capital by the addition of £15,000 in £1 ordinary shares beyond the registered capital of £10,000.

Sadler and Co., propose paying a final dividend of 3 per cent., less tax, making 6 per cent. for the year. There is a balance of £14,139 to the credit of the profit and loss account and £2,781 has been carried forward.

Genatosan, Ltd., in their report for the year ended June 30, show profit £52,141; add transfer from general reserve £30,000. A final dividend of 15 per cent. on the ordinary shares, making 25 per cent., is recommended.

Beechams Pills, Ltd.—The board of Eno Proprietaries, Ltd., have announced that as a large majority of the ordinary shareholders of the company have accepted the recent offer of an exchange of shares made by Beechams Pills, Ltd., the directors of that company propose to give effect to the agreement entered into on October 7.

Fison, Packard & Prentice increased their net profits for the year ended June 30, by £32,108, to £126,391. Gross profits, £222,528 (£174,602), tax and N.D.C., £48,912 (£32,512), depreciation, £21,174 (£22,149), general reserve, £415,000 (an increase of £15,000), carry-forward, £37,295 (£32,366), dividend less tax, 10 per cent. (9 per cent.). Anglo-Continental Guano Works, which is controlled by Fison, Packard and Prentice, announce net profits of £62,681 for the year to the end of June, an increase of £15,814 over the preceding year.

Forthcoming Events

London.

October 31.—Chemical Club. 2 Whitehall Court, S.W.1. 7.30 p.m. Annual General Meeting.

November 1.—Institution of Chemical Engineers. Burlington House, Piccadilly, W.1. 6 p.m. H. Guinot and F. W. Clark, "Azeotropic Distillation in Industry."

November 1-2.—Institution of Gas Engineers. Autumn Research Meeting.

November 2.—Society of Public Analysts and Other Analytical Chemists. Burlington House, Piccadilly, W.1. 8 p.m.

November 3.—Chemical Society. Burlington House, Piccadilly, W.1. 8 p.m. Meeting for the reading of original papers.

November 7.—Society of Chemical Industry. Burlington House, Piccadilly, W.1. 8 p.m. Joint Meeting with the Chemical Engineering Group.

Bristol.

November 3.—Society of Chemical Industry. Joint meeting with the Institute of Fuel. The University, Woodland Road. 7.30 p.m. Dr. D. T. A. Townend, "Some Combustion Phenomena of Higher Hydrocarbons."

Cardiff.

November 4.—Society of Chemical Industry (South Wales Section). University College, Cathays Park. 7 p.m. Dr. W. R. Harrison, "The Examination of Questionable Documents."

Edinburgh.

November 2.—Chemical Society. Joint meeting with Edinburgh University Chemical Society. Medical Chemistry Theatre, Teviot Place. 7.30 p.m. Professor R. G. W. Norrish, "Plastics and Polymerisation."

Glasgow.

November 4.—Society of Chemical Industry. Royal Technical College. 7.30 p.m. Dr. J. A. B. Smith, "The Metabolism of Animal Fat."

Hull.

November 1.—Hull Chemical and Engineering Society. East Hull Gas Co.'s Showrooms, Holderness Road. 7.45 p.m. B. Stonham and R. Metcalfe, "Recent Developments in the Manufacture and Utilisation of Town Gas."

Manchester.

November 2.—Institute of Metals. Blackfriars House, Blackfriars Street. 7.15 p.m. D. M. Smith, "Quantitative Spectrographic Analysis."

November 3.—Institute of Petroleum. Engineers' Club, Albert Square. 7.15 p.m. R. McDonald, "Industrial Greases."

Newcastle.

November 2.—Society of Chemical Industry. Dr. L. H. Lampitt, "Food, Mass Production and Control."

November 8.—Institute of Metals. King's College. 7.30 p.m. L. W. Schuster, "Relationship between Mechanical Properties and Results in Service."

N.E. Coast Institution of Engineers and Shipbuilders. Sir William Bragg, "Strength of Materials, Molecular Basis."

Swansea.

November 8.—Institute of Metals. Y.M.C.A. Swansea. 6.30 p.m. H. J. Miller, "Copper Alloys and their Adaptation to Modern Engineering Requirements."

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Egypt.—The Commercial Secretary at Alexandria reports that the Prisons Administration of the Egyptian Ministry of the Interior is calling for tenders, to be presented in Egypt by December 6, 1938, for the supply of quantities of medical articles. Firms desirous of offering goods of United Kingdom manufacture can obtain further details of this call for tenders upon application to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. (Ref T.Y. 28057/1938).

British India.—A firm of general merchants and agents with branches at Calcutta and Rangoon wishes to obtain the representation, on a basis to be arranged, of United Kingdom manufacturers or exporters of iron and steel goods and heavy chemicals for India. (Ref. No. 282).

British India.—A well-established firm of agents at Karachi wishes to obtain the representation, on a commission, consignment or purchasing basis, of United Kingdom manufacturers of paint and distemper for India (excluding Southern India). (Ref. No. 284).

British West Indies.—A firm of agents established at Kingston, Jamaica, wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of drugs and proprietary medicines for the British West Indies. (Ref. No. 285).